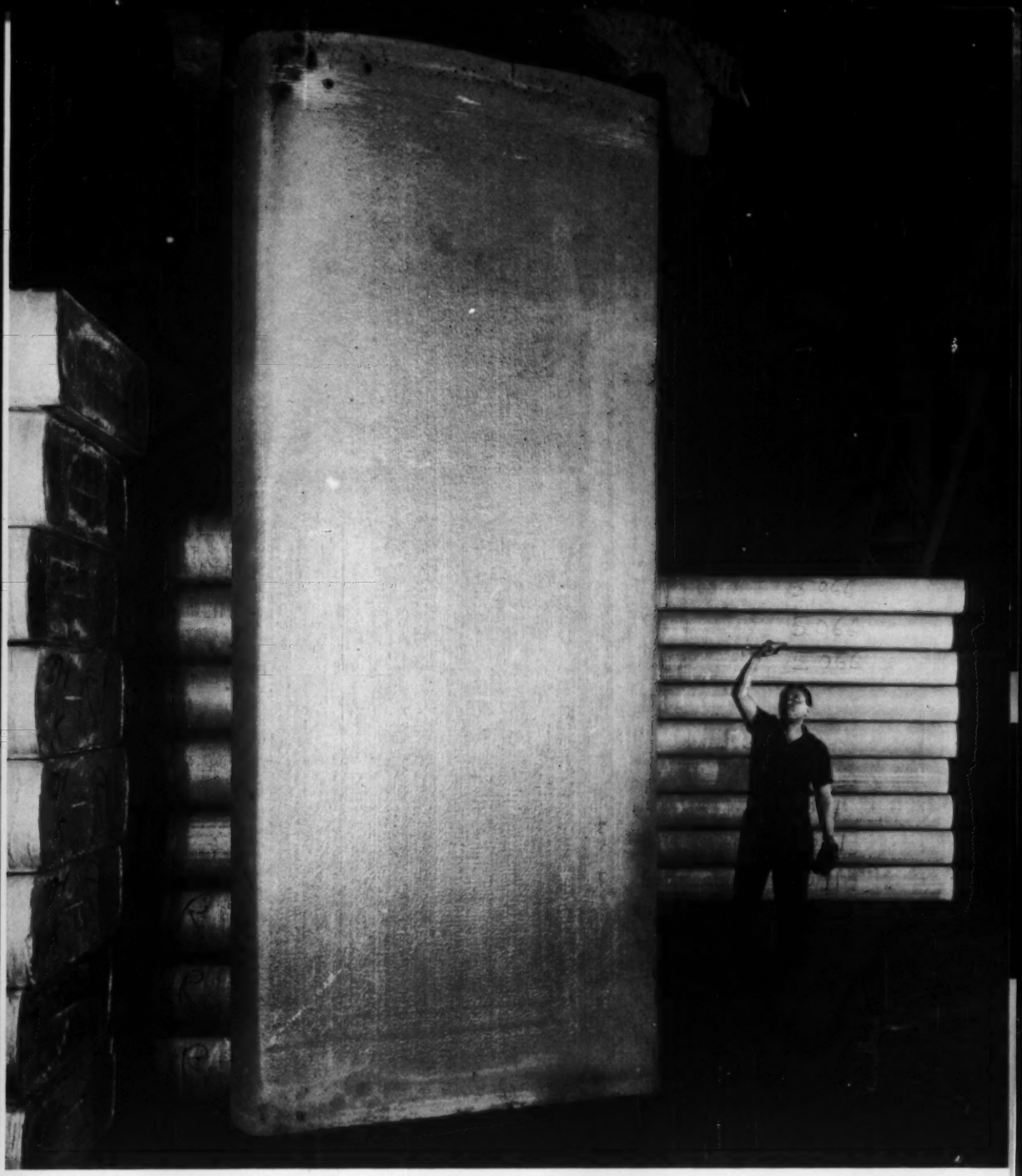
STEEL The Metalworking Weekly

APRIL 24, 1961



Aluminum Moves to Pinpoint Its Marketing for the Sixties . . . . . Page 95

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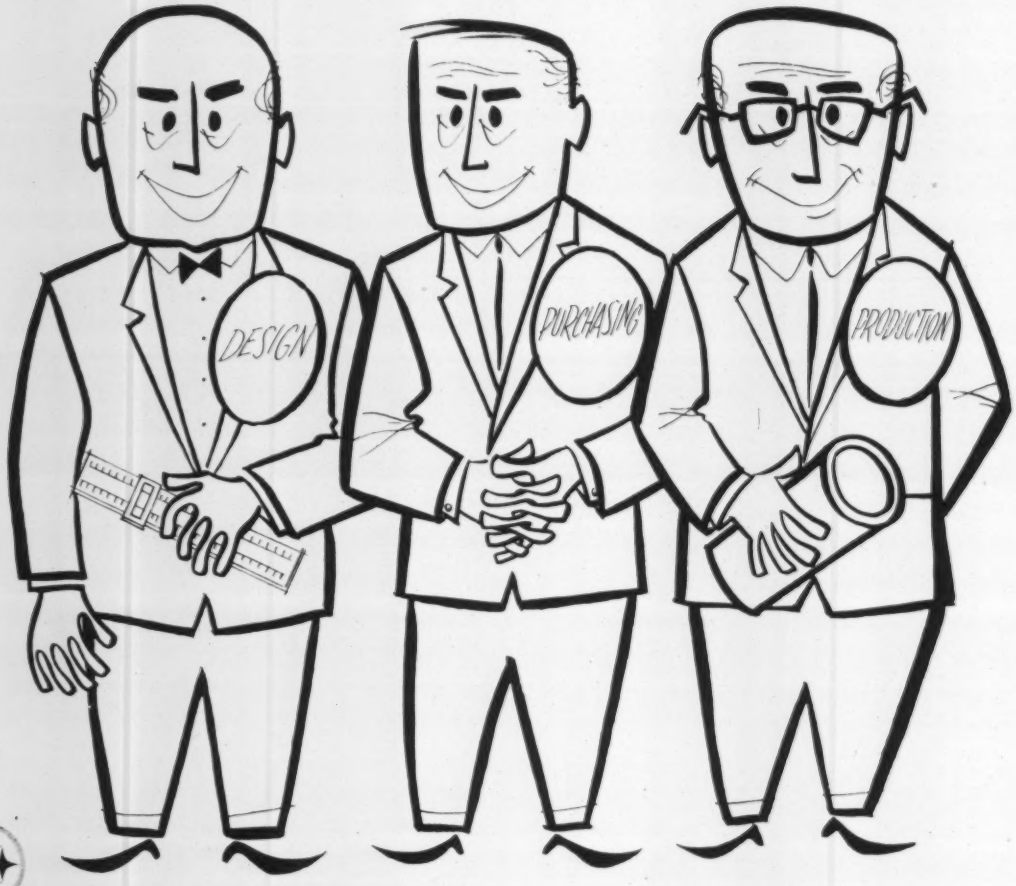


Steel

ALL THREE CAN CONTRIBUTE MORE TO LOWER UNIT COST

because of B&W Job-Matched Tubing

How so? B&W makes sure the purchasing agent gets the proper steel tube for the job—when he wants it, at a competitive price. The design engineer can choose from B&W's complete selection of types, grades and sizes to put flexibility into his design—economy and efficiency into the finished product. The production manager can count on B&W's uniform properties and dimensions for fast, easy fabrication —high-speed, low-cost production. In being able to satisfy the specific requirements of all three, B&W Job-Matched Tubing assures a high quality finished product at the lowest possible unit cost.

May we tell you more? Just call your local B&W District Sales Office or write for Bulletin T-469. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

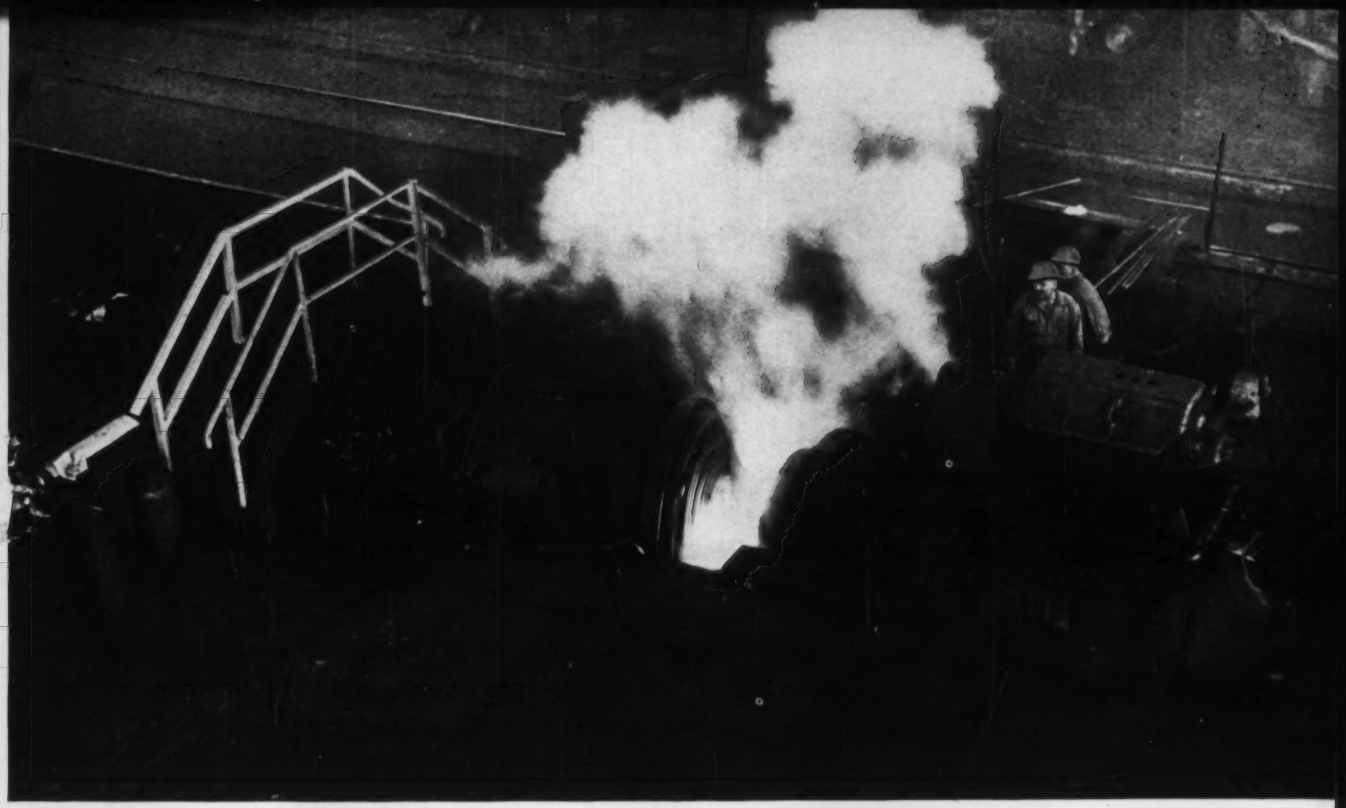
B&W

THE BABCOCK & WILCOX COMPANY

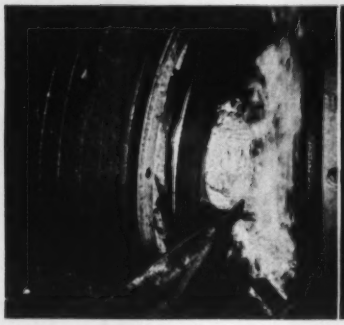
TUBULAR PRODUCTS DIVISION

TA-1001-G

Seamless and welded tubular products, solid extrusions, rolled rings, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals



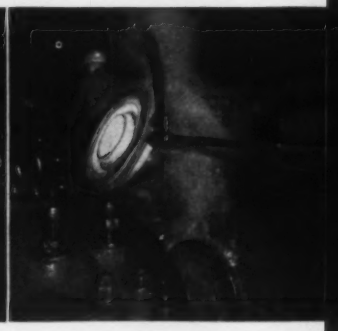
START: Heated billet is centered between dies of the Slick Mill.



15 SECONDS
Upset-forging starts.

30 SECONDS
Rolling cycle starts.

40 SECONDS
Forging is completed.



55 SECONDS
Forging is removed from mill.

One minute... one circular forging

That's all the time it takes to convert a heated billet (100 to 2,000 lb) into a contoured forging on Bethlehem's unique Slick Mill.

But fast operation is only one reason why Bethlehem's Slick Mill turns out a top-quality forging at a price that's hard to match.

Ask us, or our nearest sales office, about the quick die changes, which make it possible—and economical—to set up production runs as small as 25 or 50 pieces. Ask about the low die charges which are made possible by the brief contact between die and work. Ask about the light-weight sections this mill can produce, without sacrificing strength.

We'd also like to tell you about the excellent grain flow, machinability, and soundness of every Bethlehem circular forging.

Ask. You'll like the money-saving answers.

Steel *for Strength ... Economy ... Versatility*

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

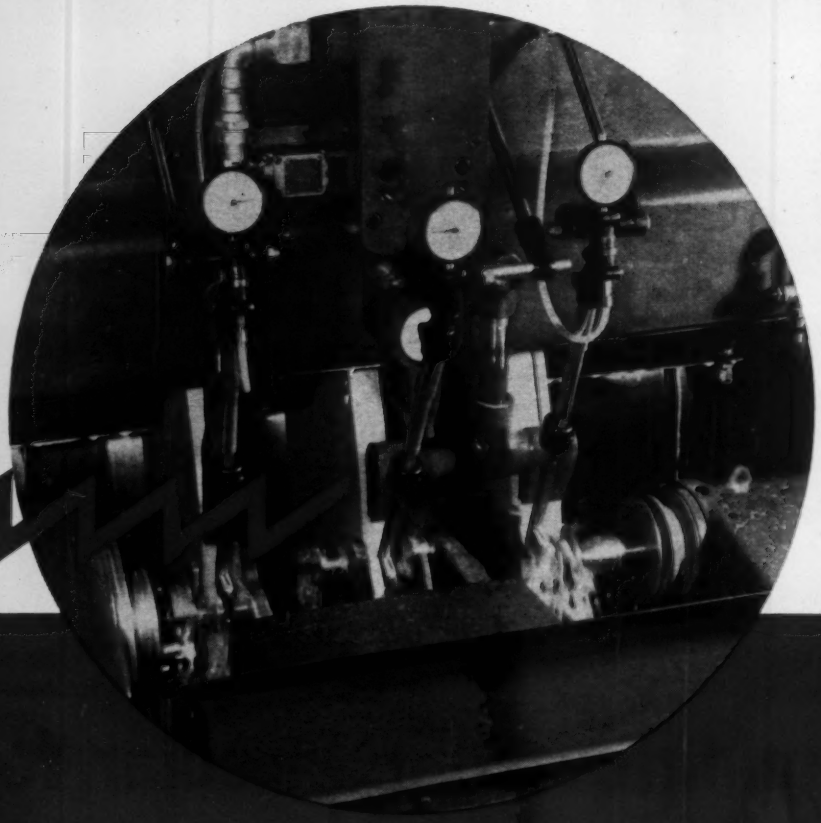
BETHLEHEM STEEL

Automatic Race grinder

10″ R Plain grinder

14″ IWR Multiple Wheel grinder

Landis production grinders with Microfeed® deliver closer tolerances consistently



Microfeed

- a new Landis precision wheelfeed that is a major breakthrough in size control
- assures cylindrical grinding precision to your specified tolerances on a production basis
- automatically cancels all variables that have an effect on final work size
- available on new Landis grinders

For multi-wheel or single wheel grinding, Microfeed assures quality and reliability.

LANDIS

world leader in precision grinders

LANDIS TOOL COMPANY, WAYNESBORO, PA.

FOR NEW IDEAS IN

HEATING AND MELTING BY INDUCTION...

The complete line of furnaces for die casting includes: Single Hearth Holders; Single or Double Hearth Ajaxomatics for automatic pouring; Double Hearth Melters and Holders for hand ladling.

WATCH AM

AJAX Induction Heating is our ONLY Business

AJAX Magnethermic CORPORATION

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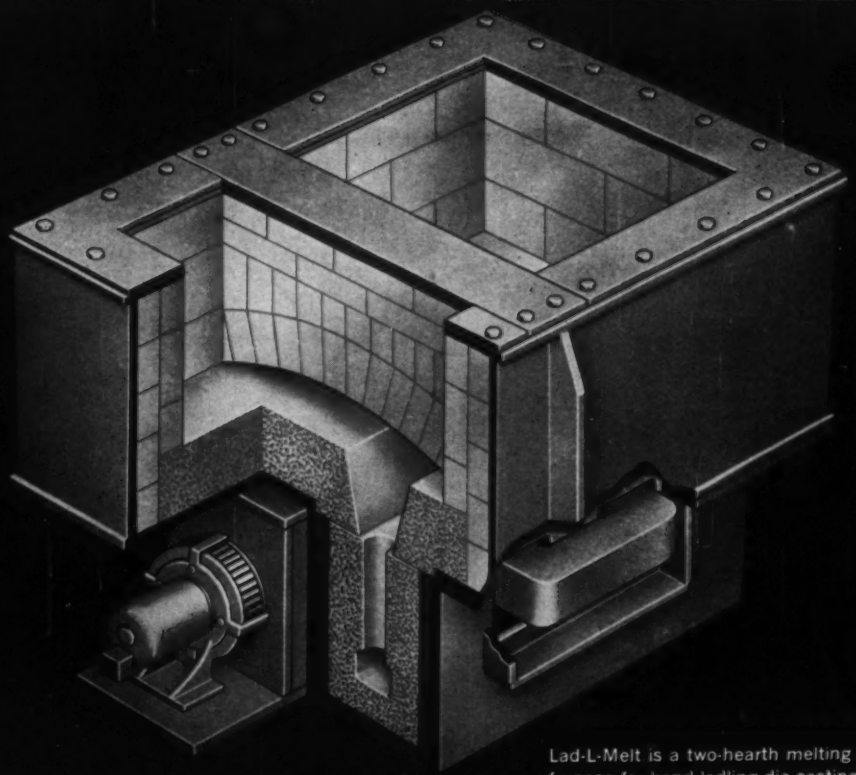

Lad-L-Melt is a two-hearth melting and holding furnace for hand ladling die casting operations.

NEW! WARNER & SWASEY'S O-AC Single Spindle Chucking Automatics designed to automate the production of small precision parts...hold exceptionally close tolerances...set up fast on small lots

Sculpture in Steel

Brigham Young was known as a steel willed pioneer who blazed his way into the West and colonized Utah as the leader of the Mormons.

Now, Jay Colver, Orem, Utah, has sculptured the leader in steel. His work is 4 ft high and weighs about 400 lb.

He used cutting and welding torches for the entire project. Bending and shaping were done by hand. He shaped the steel cold wherever possible. Brigham's hair and beard are steel strips formed into an unusual likeness.

Coming Up

Geraldine, our cleaning woman and night editor, reports midnight oil is burning in the editorial precincts. Associate Managing Editor Vance Bell, Metallurgical Editor Ed Case, and Associate Editor Brian Wilson are deep in the preparation of a study on refractory metals for structural uses. It will appear in the May 8 issue.

We rushed to Vance to learn what he means by "structural uses." He replied from behind a mound of papers 3 ft high: "We mean the use of those metals in wrought forms (such as sheets, bars, and wire) rather than as alloying materials."

He added: "Sales of refractory metals for structural uses now total more than $100 million a year."

For this study, the editors are considering these 14 materials as refractory metals: Chromium, vanadium, rhodium, hafnium, ruthenium, columbium, iridium, molybdenum, tantalum, osmium, rhenium, tungsten, platinum, and palladium.

The report will be the fifth in a series on Trends in Metals.

Creed for Engineers

The Recommended Practices Committee of the International Society of Philosophical Engineers has compiled Finagle's Universal Laws for naive engineers:

1. In any calculation, any error which can creep in will do so.
2. Any error in any calculation will be in the direction of most harm.
3. In any formula, constants (especially those obtained from engineering handbooks) are to be treated as variables.
4. The best approximation of service conditions in the laboratory will not begin to meet those conditions encountered in service.
5. The most vital dimension on any plan or drawing stands the greatest chance of being omitted.
6. If only one bid can be secured on any project, the price will be unreasonable.
7. If a test installation functions perfectly, all subsequent production units will malfunction.
8. All delivery promises must be multiplied by a factor of 2.0.
9. Major changes in construction will always be requested after fabrication is nearly completed.
10. Parts that positively cannot be assembled in improper order will be.
11. Interchangeable parts won't interchange.
12. Manufacturer's specifications of performance should be multiplied by a factor of 0.5.
13. Salesmen's claims for performance should be multiplied by a factor of 0.25.
14. Installation and operating instructions shipped with any device will be promptly discarded by the receiving department.
15. Any device requiring service or adjustment will be least accessible.
16. Service conditions as given on specifications will be exceeded.
17. If more than one person is responsible for a miscalculation, no one will be at fault.
18. Warranty and guarantee clauses are voided by payment of the invoice.

Bougar T. Factor, Chairman

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13 Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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Large Pitch Chain

is

"ENDURANCE TESTED"

for

Heavy Duty Applications

Here's a chain capable of withstanding the severest of abuse and punishing shock loads. Their glass-hard wearing surfaces and rugged heat treated links give you dependable performance under conditions far too grueling for ordinary chains.

In Acme's modern plant, these roller chains are pretested for endurance and strength. This is your assurance of getting efficient chain performance and durability under the most severe job requirements.

If you have a heavy-duty installation there's an Acme roller chain built with the characteristics necessary to do the job effectively and more economically.

Call your Local Industrial Distributor or our Engineering Department for fast service on your chaining problems.

Write Dept. 10-W for new ill. 100 page catalog with engineering section.

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RELIABLE CHAIN DRIVES FOR ALL INDUSTRIES

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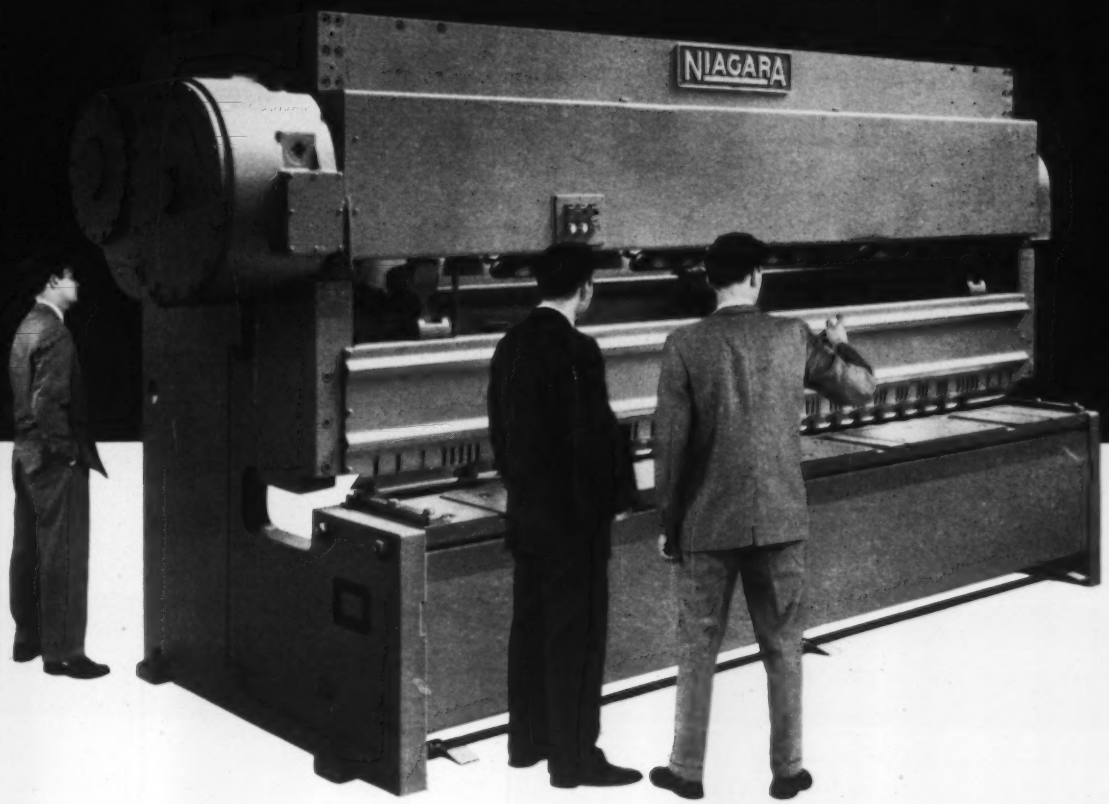

new gap frame series has quietest holddown in the industry!

Fifty percent (50%) faster than ever before and by far the most accurate of all, new Niagara Gap Frame Shears have a quiet operating holddown that's the talk of the industry.

And no wonder. Holddown feet simply never touch the bed. Yet they apply full pressure . . . a powerful toggle-action grip on thick and thin material alike. Simultaneously, in fact. There's *never* any pounding or hammering of the bed. *Naturally*, it's bound to be quieter!

But, because attention is currently focused on the holddown, don't *you* overlook these other equally important features:

- Massive, closed box section bed forms a rigid backbone for the shear and a solid backing for the knife.
- Rigid, closed triangular section crosshead keeps upper knife in perfect alignment without shims or set screws.
- Combined, total rigidity assures utmost accuracy and square cuts.
- Reduced slope of upper knife produces flatter strips with less twist or curl.
- Front controlled 2-speed power back gage provides extra work clearance at rear of machine.
- New mirror-light gage enables shearing wider sheets to a scribed line.

Now for more facts and figures, request Bulletin 860-S. Write today. NIAGARA MACHINE & TOOL WORKS, 683 Northland Ave., Buffalo 11, N. Y.

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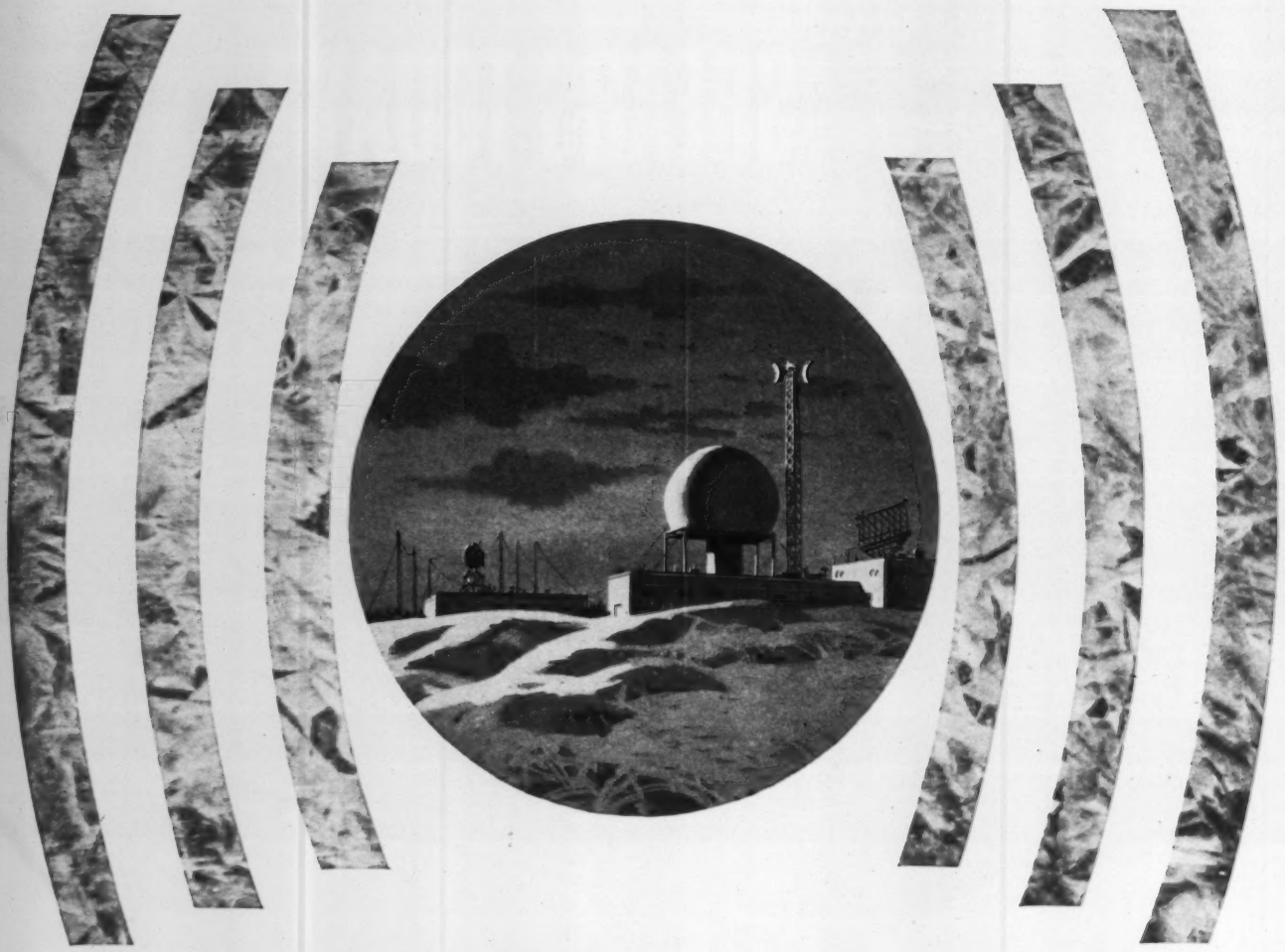
The Most Extensive Line of Shears in the Industry . . . Overdrive and Underdrive . . . Power and Manual

U.S. Air Force DEW-Line buildings fend off corrosion . . .



GUARDED BY GALVANIZED STEEL

Galvanized steel sheets—over 300 tons—will fill a vital need in the construction of unique air terminal/storage buildings for our Air Force's DEW (Distant Early Warning) Line.

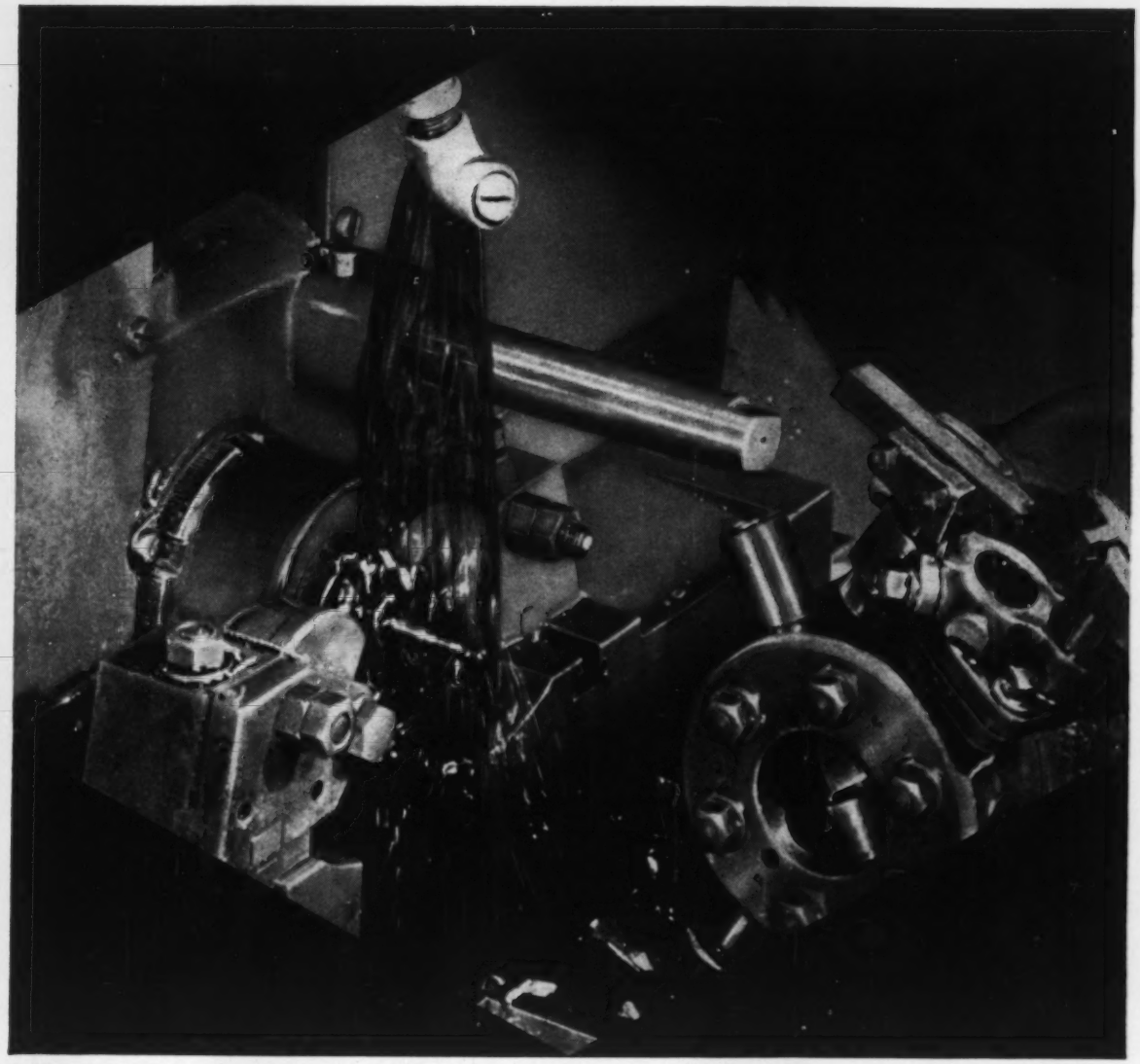
The need? Maximum strength plus a defense against the DEW Line's dew point. Based north of the Arctic Circle, these buildings and their interior warmth will abut against bitter outside cold to create a temperature differential up to 130°—and a condensation-corrosion threat as extreme as the –60° surroundings. To eliminate the threat, each building will consist of: insulated galvanized steel floor construction, galvanized steel for outer skin of sidewalls, galvanized steel for inside (vapor barrier) face of sidewalls.

WEIRKOTE® IN PARTICULAR! To the inherent strength, economy and versatility of steel, Weirkote adds enduring zinc protection via the modern continuous process. As a result, Weirkote galvanized steel can be worked to the very limits of the steel base without chipping or peeling. And it assures you of long-lasting protection against corrosion. It is manufactured by two National Steel divisions, Weirton Steel and Midwest Steel. Write Weirton Steel Company, Weirton, West Virginia, for further details.

MIDWEST STEEL
Portage, Indiana

WEIRTON STEEL
Weirton, West Virginia

divisions of
NATIONAL STEEL CORPORATION



Replace those black, sulfurized oils! Get cooling, cutting properties you need in a transparent Sunicut cutting oil that lets operators *see* tools, workpieces, finishes and micrometer readings. Sunoco has a wide range of high quality, non-emulsifying Sunicut cutting oils for general-purpose or special-problem operations. They pump easily, wet metal fast, have high film strength, will not stain operators' hands or clothing.

You'll see more than just the job...with Sunicut

SUNOCO

QUALITY...

THE BEST ECONOMY OF ALL

You'll see significant savings, too, when you switch to a transparent Sunicut cutting oil. For you will get the exact *quality* you need for your operation . . . *job-fitted* by men who know what they are doing . . . teamed with *service* you never have to ask for twice.

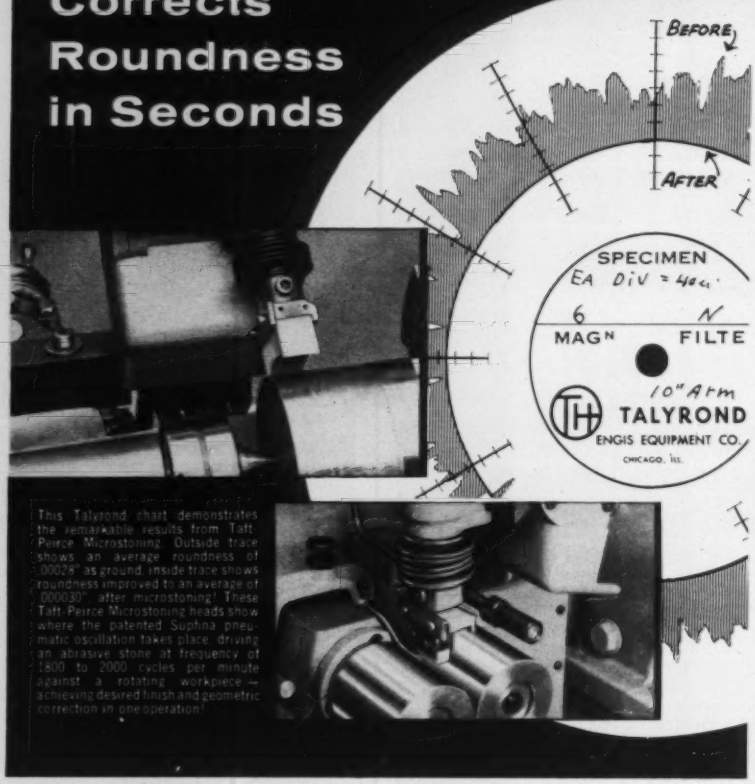
Let a Sunoco representative get you started with a Sunicut cutting oil now. The dividends in extra performance and savings will prove how right you were in investing in Sunoco quality.

Sun Oil Company, Philadelphia 3, Pennsylvania, Department S-4. In Canada: Sun Oil Company Limited, Toronto and Montreal.

PIONEERING PETROLEUM PROGRESS FOR 75 YEARS

MICROSTONING

Corrects Roundness in Seconds



This Talyrond chart demonstrates the remarkable results from Taft-Peirce Microstoning. Outside trace shows an average roundness of .00028" as ground, inside trace shows roundness improved to an average of .000030" after microstoning! These Taft-Peirce Microstoning heads show where the patented Supfina pneumatic oscillation takes place, driving an abrasive stone at frequency of 1800 to 2000 cycles per minute against a rotating workpiece — achieving desired finish and geometric correction in one operation!

Anyone can get roundness correction if they don't care about time and cost. But, Taft-Peirce Microstoning produces a *controlled* microinch surface finish, removes cutting tool marks, and dramatically improves roundness — all in one simple operation and in a matter of seconds!

You'll find the results in product quality and performance amazing. Shafts and cylinders run quieter, work smoother, won't wear as fast. And you'll find your whole finishing operation is faster, costs less and is easier to operate. All types of metals, hard plastics, and other non-metallic materials can be microstoned.

Try Microstoning on your products! You can use Taft-Peirce/Supfina Microstoners on lathes, boring mills, planers and other machines; or select Centerless Plunge-Cut and Through-Feed Centerless Machines for volume production on small parts. See your nearest Taft-Peirce Agent or send for new Microstoning Catalog No. 319 for detailed information.

Finish it with

TAFT-PEIRCE *SUPFINA*

TAFT-PEIRCE MANUFACTURING CO. 25 MECHANIC AVENUE, WOONSOCKET, R. I.

CALENDAR
OF MEETINGS

May 8-10, National Welding Supply Association: Annual convention, Hotel Commodore, New York. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Robert C. Fernley.

May 10-11, American Institute of Steel Construction: Annual engineering conference, Hotel Leamington, Minneapolis. Institute address: 101 Park Ave., New York 17, N. Y. Executive vice president: L. Abbett Post.

May 14-17, Copper & Brass Research Association: Annual convention and exhibit, Homestead Hotel, Hot Springs, Va. Association's address: 420 Lexington Ave., New York 17, N. Y. Managing director: Theodore E. Veltfort.

May 14-17, National Fluid Power Association: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 5595 N. Hollywood Ave., Milwaukee 17, Wis. Executive vice president: Barrett Rogers.

May 14-17, Steel Service Center Institute: Annual meeting, Statler-Hilton Hotel, Washington. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president: Robert G. Welch.

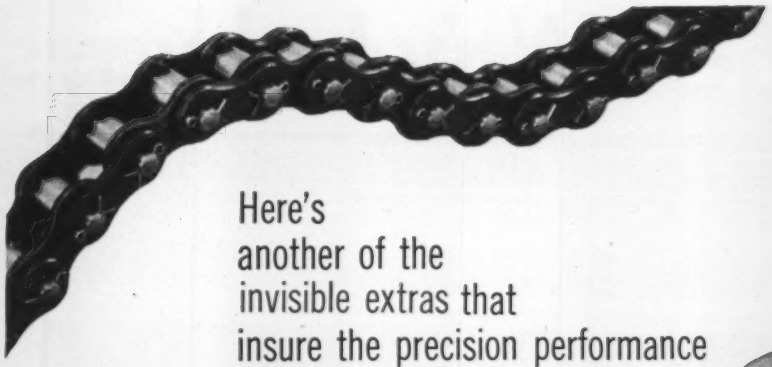
May 15-18, Machinery Dealer's National Association: Annual meeting, Shoreham Hotel, Washington. Association's address: 1346 Connecticut Ave. N. W., Washington 6, D. C. Executive director: R. K. Vinson.

May 17-19, Metallurgical Society of AIME: Conferences on management of materials research and engineering, Arden House, Harriman, N. Y. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

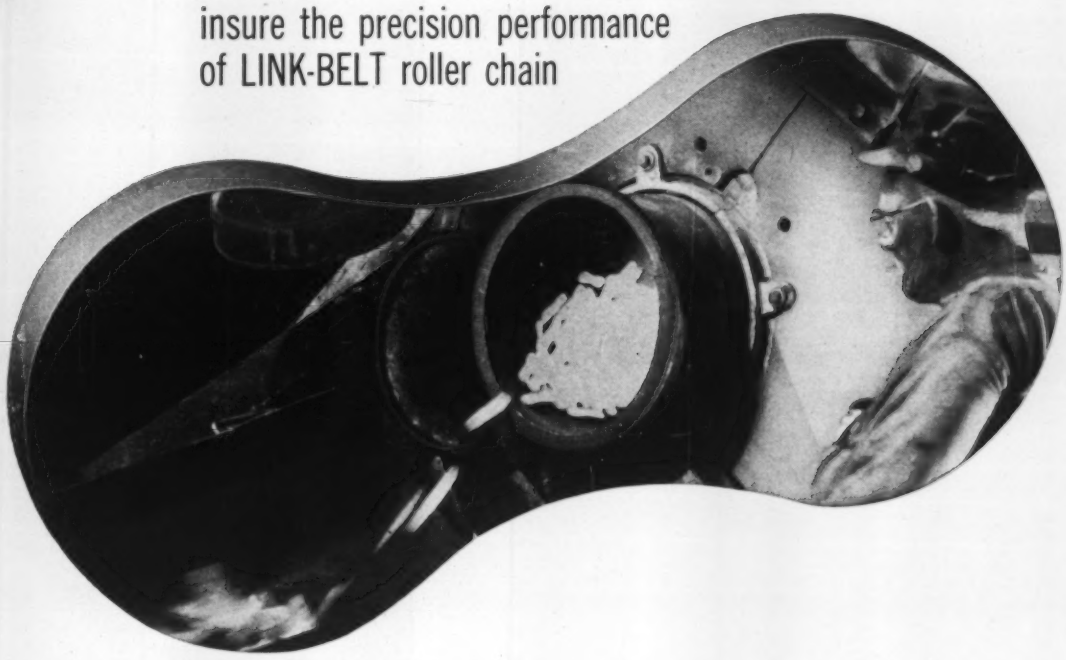
May 18-19, National Industrial Conference Board Inc.: Annual meeting, economic conference, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

May 21-23, Fluid Controls Institute Inc.: Annual meeting. The Cloister, Sea Island, Ga. Institute's address: P. O. Box 667, Pompano Beach, Fla. Executive secretary: Edwin R. Rath.

May 21-24, Industrial Heating Equipment Association Inc.: Spring meeting, The Homestead, Hot Springs, Va. Association's address: 1145 19th St. N.W., Washington 6, D. C. Executive vice president: Robert E. Fleming.



Here's
another of the
invisible extras that
insure the precision performance
of LINK-BELT roller chain

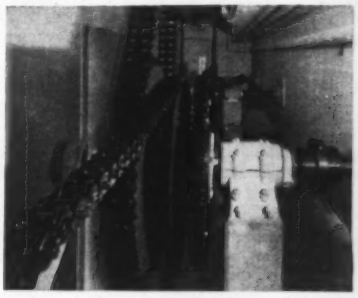


Painstaking precision of heat-treat control gives you

uniform strength in every link

To produce roller chain of utmost uniformity, Link-Belt maintains exacting control of all heat-treating processes. With equipment and instrumentation exactly tailored to the need, all processes are carefully adjusted to suit the characteristics of each heat and analysis of steel. Result: roller chain of uniform strength *well above accepted standards*. Chain that absorbs shock loads, delivers full power under continuous heavy going.

Precise heat-treat control is one of many *invisible extras* that contribute to the greater strength and endurance of Link-Belt roller chain. Others include prestressing, pitch-hole preparation, shot-peening. These features—plus painstaking precision and inspection in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high speeds.



Single and double strand Link-Belt roller chains combine to provide dependable, positive power transmission at this installation.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor. See CHAINS in the yellow pages of your phone directory.

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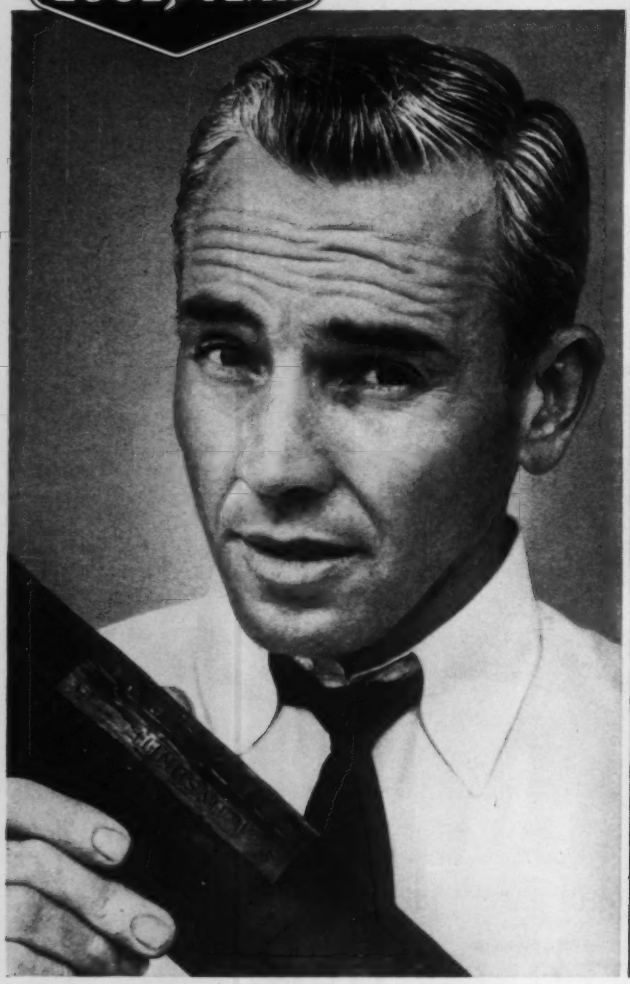
LINK-BELT

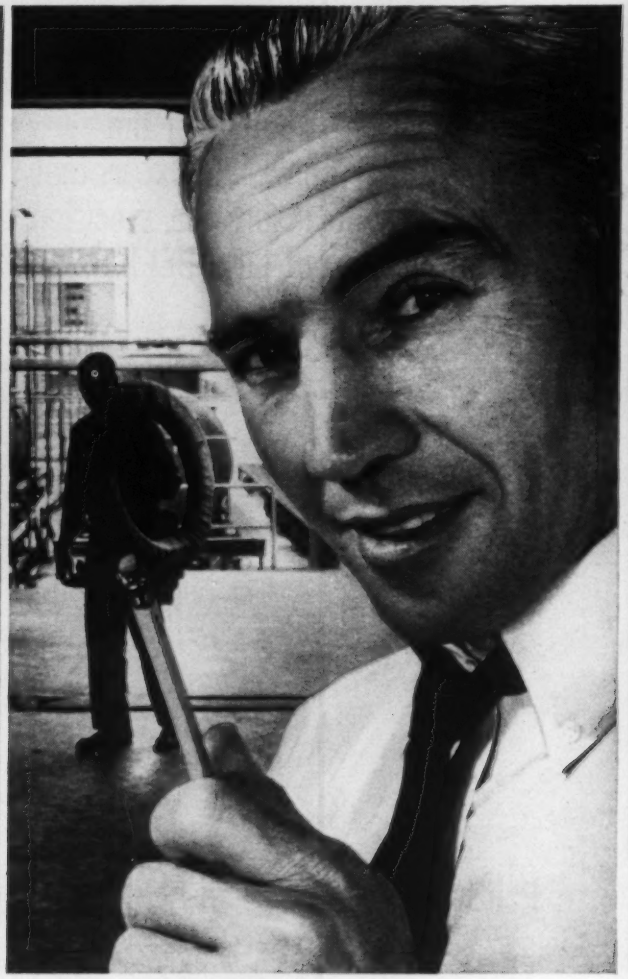
ROLLER CHAINS AND SPROCKETS

Why I always

GOODYEAR



THEY MAKE EVERY HOSE I NEED
(No more time and money wasted looking for exactly the right kind of hose for a job —*Goodyear's got it!)*

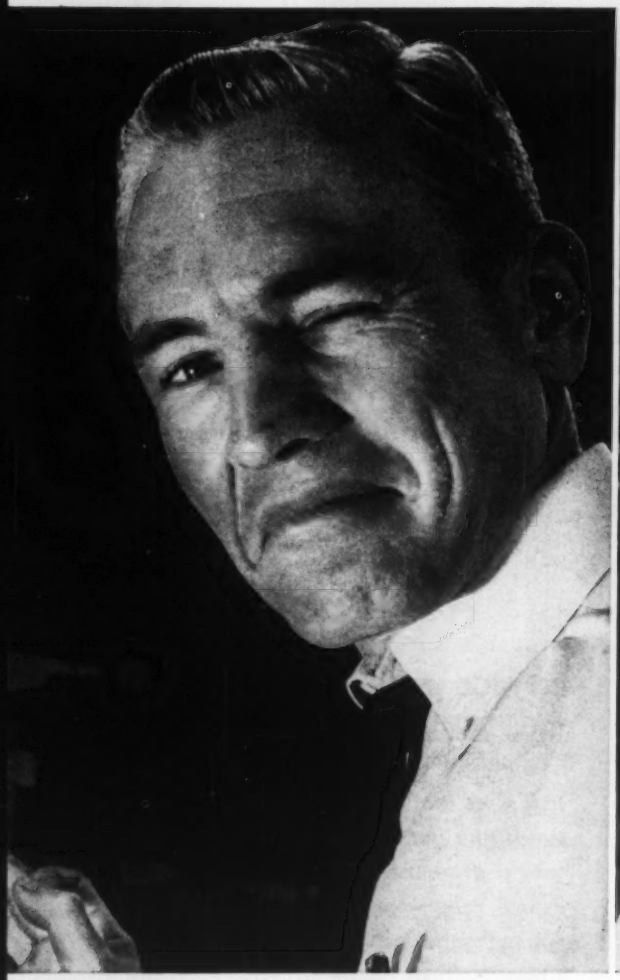


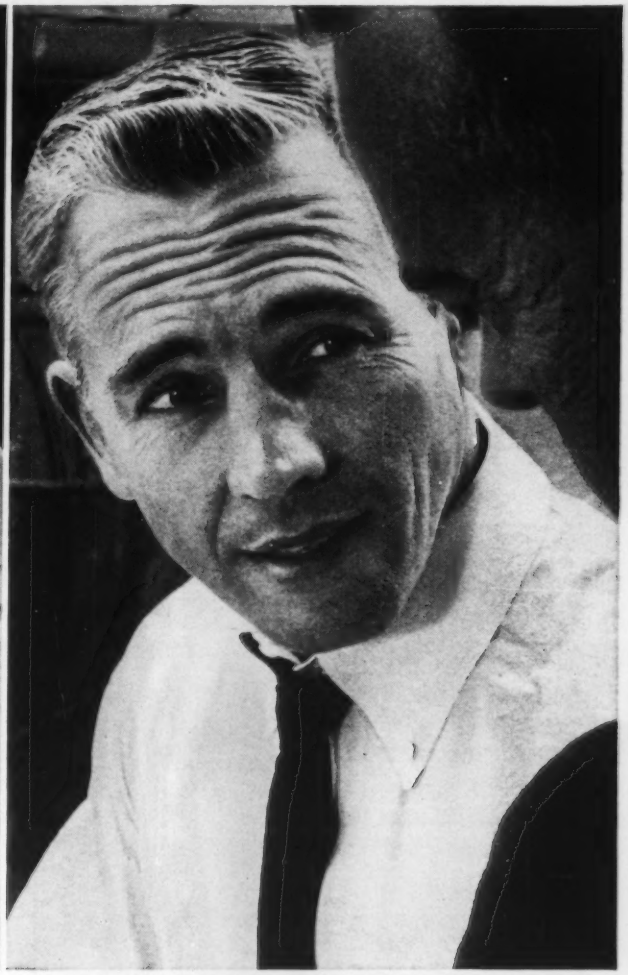
THEY'VE GOT FAST DELIVERIES I NEED
(No more out-of-stock delays! Via network of stocking distributors in all parts of the country—*Goodyear's got it!)*

For the right hose... at the right place... at your Goodyear Distributor... first in service

Lots of good things come from **GOOD**

buy hose from Goodyear





THEY HAVE TOP QUALITY I NEED
(No more settling for second-best. When it comes to quality, reliability and safety *—Goodyear's got it.)*

THEY OFFER TECHNICAL HELP I NEED
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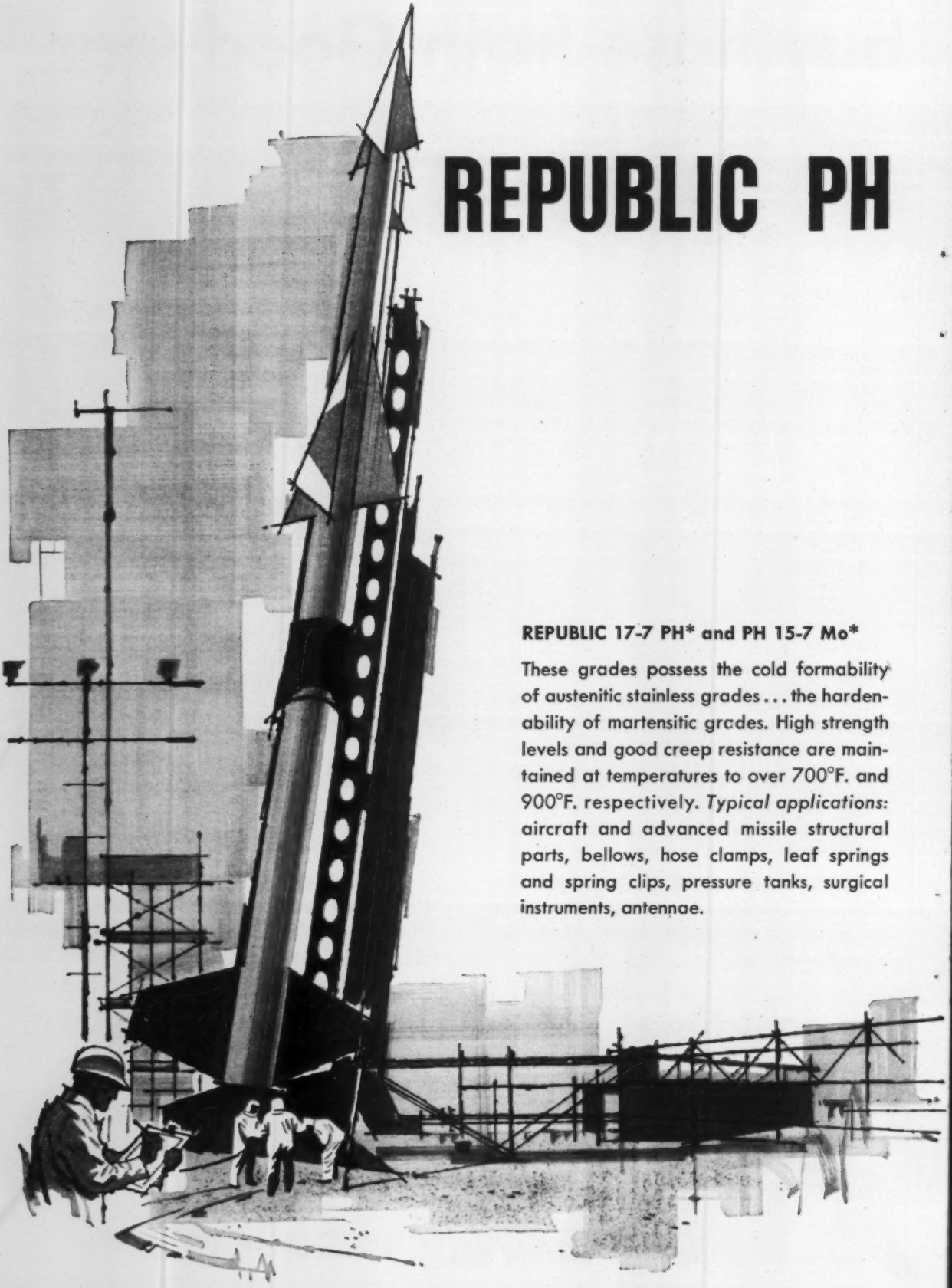
GOODYEAR INDUSTRIAL PRODUCTS

REPUBLIC PH



REPUBLIC 17-7 PH* and PH 15-7 Mo*

These grades possess the cold formability of austenitic stainless grades . . . the hardenability of martensitic grades. High strength levels and good creep resistance are maintained at temperatures to over 700°F. and 900°F. respectively. *Typical applications:* aircraft and advanced missile structural parts, bellows, hose clamps, leaf springs and spring clips, pressure tanks, surgical instruments, antennae.

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BECAUSE THEY OFFER GREATER VERSATILITY, precipitation hardenable stainless steels broaden the already wide field of stainless steel applicability . . . Republic PH Stainless Steels available in the standard mill products effectively reduce fabricating costs. Higher developed strengths —*which remain high at elevated temperatures*— are coupled with the formability and corrosion-resistance of other stainless grades. Mail coupon for data.

REPUBLIC 17-4 PH*

Simple heat treatment after fabrication develops high strength levels without excessive distortion or scaling. Unlike most martensitic chromium types, Republic 17-4 PH* is welded without preheating or post annealing, thus resulting in lower fabricating costs. *Typical applications:* bearings, bolts, shafts, aircraft fittings, gears, splines, mandrels, pins, seats, and valves.

REPUBLIC A-286

In addition to excellent corrosion-resistance, this grade is designed to afford elevated temperature creep and stress rupture strength to over 1200°F. Because it is used on critical applications, majority of tonnage produced is processed from ingots that have been vacuum melted by Republic's consumable electrode process. *Typical applications:* jet engine and gas turbine components such as wheels, blades, frames, housings, afterburners, tail cone parts, and fasteners.

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Machine Tool Builder Wants Trade with Russia

Everett M. Hicks, president, National Machine Tool Builders' Association, said last week that he favored selling U. S. made machine tools to Russia. At the Westinghouse Silver Anniversary Machine Tool Forum, Mr. Hicks reasoned: 1. U. S. builders need the sales. 2. Russia buys freely from West Germany and England, so our refusal doesn't hurt the Reds. 3. "Our only real security (in the race for machine tool superiority) lies in continued improvement through research and development programs . . ." He summed up: Refusing to sell will not keep the Russians from copying our machines if they wish. They could get samples all over the world.

Another Advocate Calls for Action

"We are long overdue for a complete revision of our trade policies with Iron Curtain countries," claims Richard T. Silberman, executive vice president, Electronics Capital Corp., San Diego, Calif. In a speech before the Western Electronics Manufacturers Association, Mr. Silberman asserted: "Russia and Iron Curtain countries may today represent a small market to Western European manufacturers, but they are one of the largest potential markets for their products . . . World competition is too great to automatically exclude major segments of buying power from the markets of American manufacturers . . . We should demand a program of action and not wait until we are shocked into motion by an economic Sputnik."

A Problem in Selection

Choosing the right fork is a problem in performance, not etiquette, for this girl. As an inspector at Bulova Watch Co., Woodside, N. Y., she spotchecks 1 in. long tuning forks that are the timekeeping hearts of the firm's electronic watches. The company has introduced a clear face version of the timepiece to satisfy customers who wanted to show admirers the unique tuning fork and transistorized circuits.

Steel Firm Cites New Hot Metal Source

Allegheny Ludlum Steel Corp., Pittsburgh, has revealed completion of a large scale direct reduction test in a commercial conversion unit. "This test establishes the direct reduction-hot blast cupola plant complex as an alternate route to producing molten metal direct from iron ore," said the company. The test, sponsored by Allegheny Ludlum and R-N Corp., New York, was conducted at Gusstahlwerk Witten A. G., Witten, Germany. The charge: A burden consisting of 100 per cent R-N briquets. "Back pres-

sure and stack permeability (previously considered problems in all-briquet melting) remained stable during the test," said Allegheny Ludlum.

Chrysler President Weathers Stockholder Storm

Stockholder critics of L. L. Colbert, president of Chrysler, charged that the corporation's first quarter losses will hit $20 million, but efforts to unseat him at last week's stockholder meeting were unsuccessful. Mr. Colbert outlined his program for improving profitability: Buy only necessary replacement equipment, step up marketing, continue cost cutting. Examples of economy include combining Chrysler and Imperial production in a single plant starting in May. In the past year, 7000 salaried people have been cut from the labor force.

Aluminum Realigns Its Marketing Sights

The aluminum industry is reappraising its marketing strategy for the '60s as competition tightens, both from other materials and within the industry itself. Key decisions are being made on how to woo and win the customer and at the same time make an adequate profit. Upcoming: More customer services, wider ranges of shapes and alloys, concentration of sales efforts in areas where aluminum can "best be used." (See Page 95.)

Long Term Projections for Business in the Sixties

Drives by the Kennedy administration to step up the economic growth pace of the U. S. call for a new look at projections of key business benchmarks. Here are some computed for the sixties by Prentice-Hall Inc., Englewood Cliffs, N. J.:

		Moderate Growth		Rapid Growth*	
	1960	1965	1970	1965	1970
Labor Force (millions)	73	79	85	80	87
Gross National Product (billions)	$ 504	$ 614	$ 747	$ 675	$ 940
Per Capita Spendable Income	$1,969	$2,238	$2,524	$2,436	$3,000
Industrial Production (1957=100)	108	126	149	132	164
Manufacturers' Sales (billions)	$ 365	$ 444	$ 538	$ 485	$ 650
Construction (billions)	$ 55	$ 72	$ 93	$ 80	$ 112
Business Plant & Equipment (billions)	$ 36	$ 45	$ 55	$ 50	$ 67
Corp. Pretax Profits (billions)	$ 44	$ 58	$ 71	$ 65	$ 87
Avg. Hourly Pay in Mfg.	$ 2.29	$ 2.63	$ 3.00	$ 2.75	$ 3.20

*Except for line 1 (estimated independently), the moderate rate assumes an average annual growth of 3.5 per cent, plus 0.5 per cent for annual price increases. The rapid rate allows for growth of 4.5 per cent, plus 1.5 per cent for price increases.

Stainless Steel Car Promises Savings

U. S. Steel's Tenelon stainless is the key to economy in a covered hopper car designed for carrying bulk materials without using costly linings. The car is said to be 16 per cent lighter than those made with other steels. Washing the car between trips protects shipments from contamination.

Our Pressure from Idle Capacity

Most metalworking industries operated at less than 70 per cent of normal capacity last year, and few are faring much better now. Many industries could have manufactured their entire 1960 output with half their plant and equipment—provided it was the most efficient half. Such idle capacity creates downward pressure on prices via competition and an upward pressure on costs. Profits are pinched. Challenge to management: Bring overhead costs more in line with operating rates. For the approaches, see Page 105.

Autodom Watches UAW for Organization Changes

Walter Reuther's suggestion that hourly workers be placed on annual salaries is labeled propaganda by bargaining groups within the auto industry. They're more interested in the United Autoworkers' chief's plans to split from the CIO and form his own amalgamation of labor unions. More action is expected on that score at the union's special convention, Apr. 27-29 in Detroit. Final bargaining policies are supposed to be plotted at the meeting, but there's talk that Mr. Reuther will also propose major changes in the union's structure.

Electrochemical Polishing Improves Transistor Wafers

This electrochemical device, developed by Bell Telephone Laboratories, Murray Hill, N. J., is said to polish germanium and silicon wafers for transistors better than conventional methods—and at half the cost. Semiconductor slices are mounted on a nonconducting disc. After electrical contact is made, they are placed on a polishing wheel over which an electrolyte flows, keeping the semiconductors at a constant distance from the wheel. The method avoids mechanical damage to the crystal face.

Canadian Industry Steps Up Activity

Members of Canadian Association of Purchasing Agents report that activity in manufacturing industries has increased for the first time in several months. New orders and production are up; declines in inventory and employment have slowed considerably; and prices are comparatively stable.

Automakers Increase April-June Output 26 Per Cent

Automakers are expected to boost second quarter production schedules to 1.5 million units, up 26 per cent over the first quarter level, says *Ward's Automotive Reports*. Sales have been climbing since mid-March, with compacts accounting for 35 per cent of deliveries. The daily rate for April is 16,117 units, 2.5 per cent ahead of the month ago pace. Dealer inventories, which stood at more than 1 million units at the end of February, have been cut to 900,000 units in less than six weeks.

Grinding Experts Challenge Tradition

The men who know intend to make "abrasive machining" a contender in heavy metal removal. To do it, they are disproving a couple of common

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The Metalworking Weekly

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notions—including the one that grinding is only for producing fine finishes and close tolerances. Among the tactics: Substitution of abrasive wheels for milling cutters, re-education on metal removal via grinding. (See Page 132.)

How R&D Expenditures Are Climbing

U. S. spending for research and development totaled $12.4 billion in 1959, the National Science Foundation reports. Here's the trend:

	R&D Expenditures (In billions of dollars)						
Year	Total	% of GNP	Basic Research	% of GNP	Applied Research	% of GNP	GNP
1953	$5.15	1.41%	$0.43	0.12%	$4.72	1.29%	$365
1954	5.62	1.55	0.48	0.13	5.14	1.42	363
1955	6.39	1.61	0.55	0.14	5.84	1.47	397
1956	8.46	2.02	0.69	0.16	7.77	1.85	419
1957	10.04	2.27	0.84	0.19	9.20	2.08	443
1958	11.16	2.51	0.90	0.20	10.26	2.31	444
1959	12.43	2.58	1.00	0.21	11.43	2.37	482

MHD Engines May Propel Spacecraft

General Electric Co. will investigate the feasibility of a magnetohydrodynamic (MHD) electric engine to propel spacecraft, under a $100,000, one year, contract from the National Aeronautics & Space Administration. MHD engines have too little thrust to lift a space vehicle off the ground, but perhaps they could propel such a vehicle in outer space.

Straws in the Wind

Gray Iron Founders' Society, Cleveland, reports member foundries operated at 60 per cent of capacity in March vs. 53 per cent in February . . . Class I railroads spent $446 million for iron and steel products in 1960, an increase of $26 million over 1959, says the Association of American Railroads . . . The dollar volume of incoming sales reported in February by industrial material handling equipment makers fell less than 2 points from the January booking level . . . "In 10 to 15 years, more than half of all major household appliances will employ thermoelectric devices," predicts Dr. Samuel Shapiro, president, Materials Electronic Products Corp., Trenton, N. J. . . . The town of Springfield, Vt., has handed Congress a documented plea for depreciation reform—citing the need for U. S. industry to compete with modern plants springing up in Europe and Russia . . . International Nickel Co. Inc., New York, predicts a rise in stainless steel sales in U. S. markets to more than 1 million tons a year by 1967.

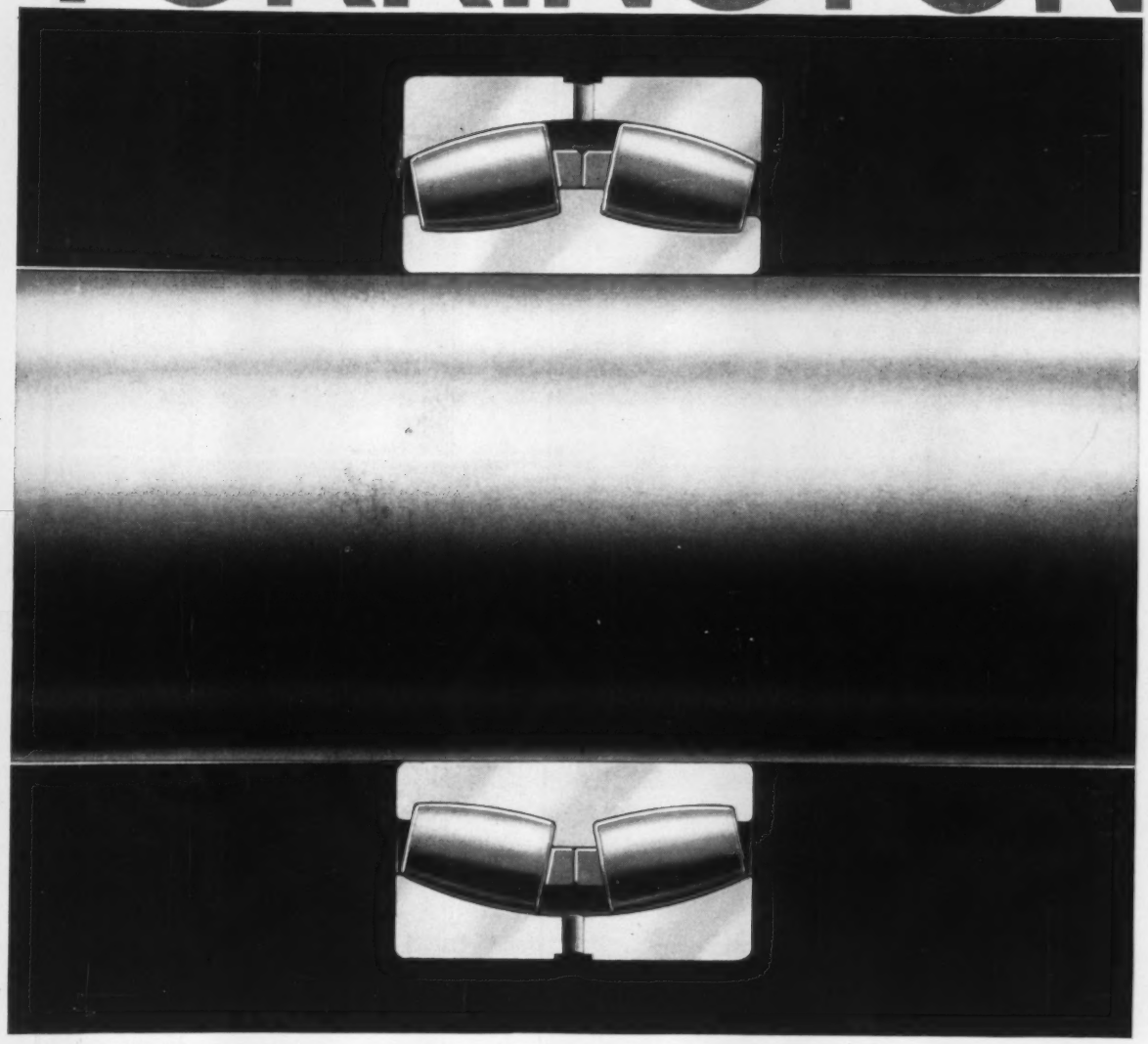
Metalworking Pulse

The Business Trend: STEEL's industrial production index jumped 4 points in the week ended Apr. 15 to a preliminary 153 (1947-49=100), the highest level since last October. Gains in steel and autos provided the main impetus. **Autos:** Stronger sales in early April gave motordom the shot in the arm it had been looking for since early February. Result: New car stocks are tumbling, production is rising. **Steel:** Ingot output continued its 3 per cent per week crawl up the scale.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended Apr. 15 .... 153†
  Year ago 163
  Details on Page 115
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Apr. 22 .. 120,000*
  Year ago 144,886
  Details on Page 112
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Apr. 22 1,800,000*
  Week ago 1,748,000
  Details on Page 180

†Preliminary. *Estimated.

TORRINGTON



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The first chemical coolants were outstanding in controlling rust and rancidity. They have done a good job and are widely accepted for many metal removal operations.

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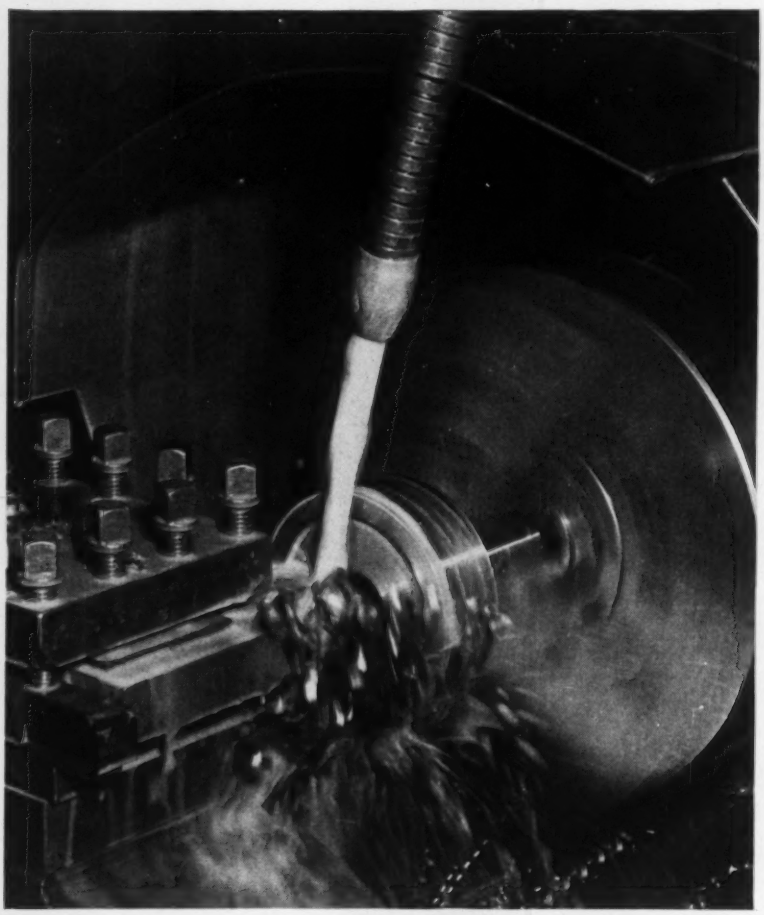
Hocut 3210 is a highly fortified water-soluble concentrate. It has outstanding anti-weld and extreme pressure characteristics. As a result, it does better those jobs previously reserved for fortified straight oils. Hocut 3210 improves finish at higher speeds without sacrificing tool life. Additionally, it eliminates smoke, oil fog and inherent fire hazards.

Hocut 3210's E.P. characteristics are released by the heat of the cutting operation. This forms a barrier between the tool and the work resulting in a clean cut, free from any welding of chip to tool. Tool life is increased, surface finish improved and parts come off the machine cool enough to handle.

Its heavy duty ability makes it an ideal coolant for tough jobs such as tapping, broaching, form grinding, internal and external thread cutting, thread rolling, plunge grinding, etc.



In spite of all the outstanding features and capabilities of Hocut 3210, its cost is most reasonable. To be up to date on this latest coolant advance, write for complete data or ask your nearby Houghton Man for a test in one of your tough jobs. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

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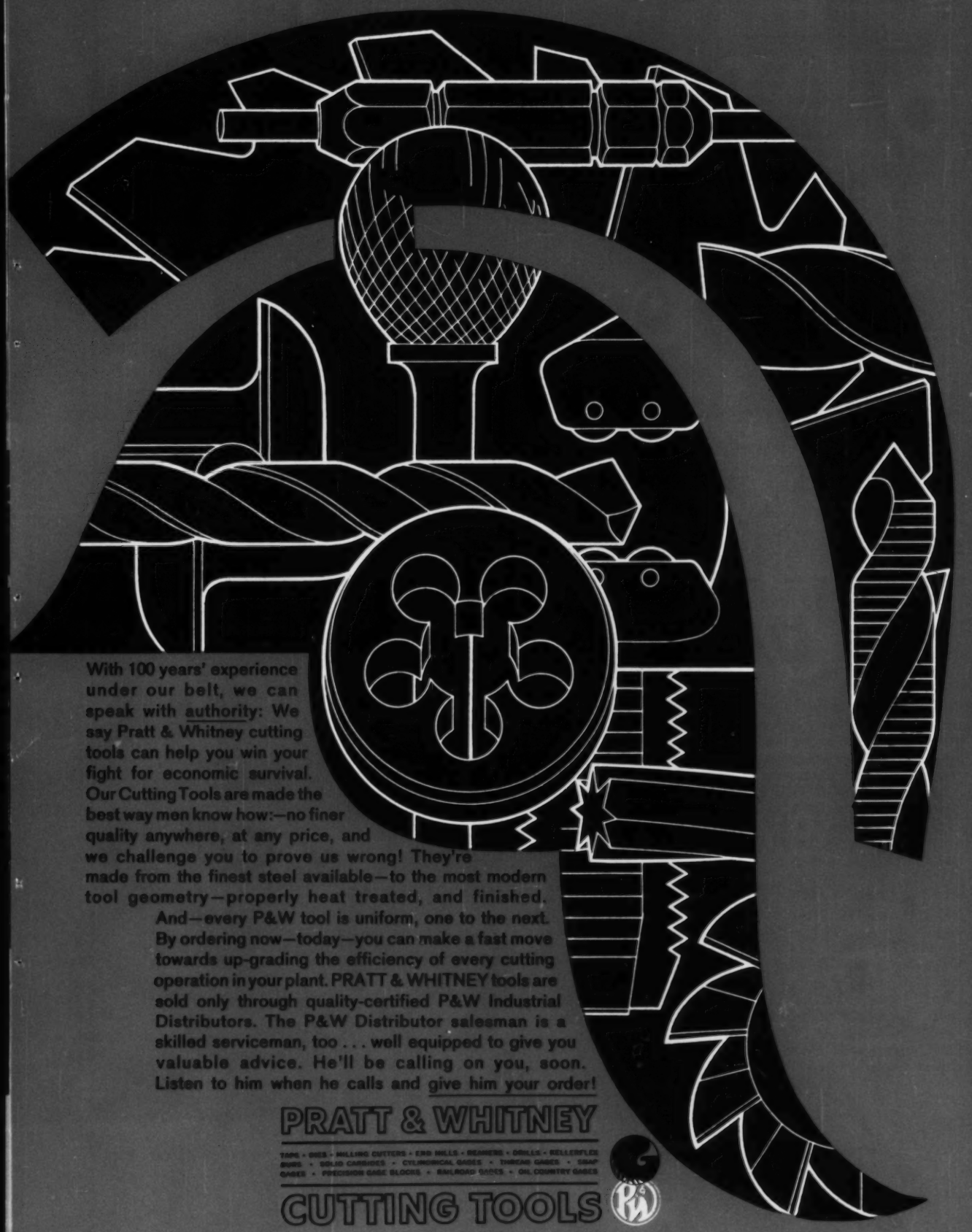

With 100 years' experience under our belt, we can speak with authority: We say Pratt & Whitney cutting tools can help you win your fight for economic survival. Our Cutting Tools are made the best way men know how:—no finer quality anywhere, at any price, and we challenge you to prove us wrong! They're made from the finest steel available—to the most modern tool geometry—properly heat treated, and finished.

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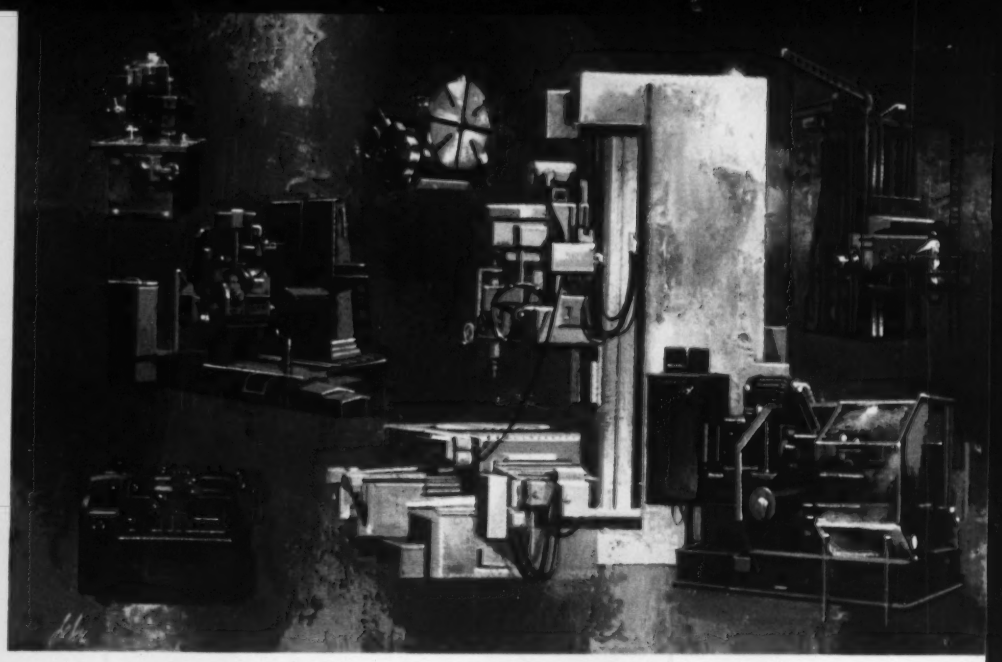

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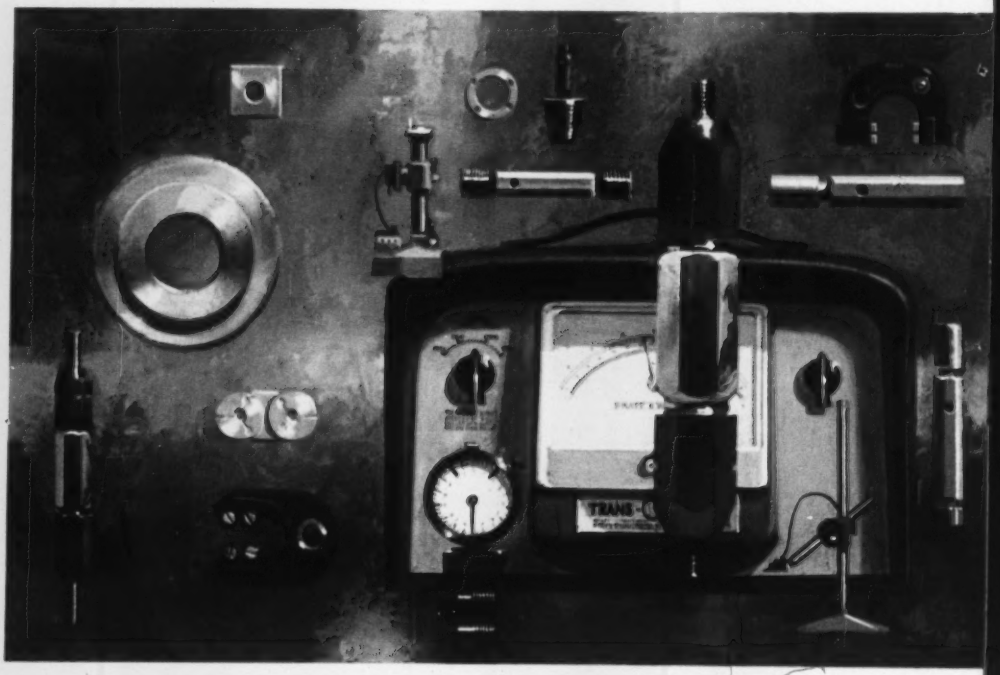

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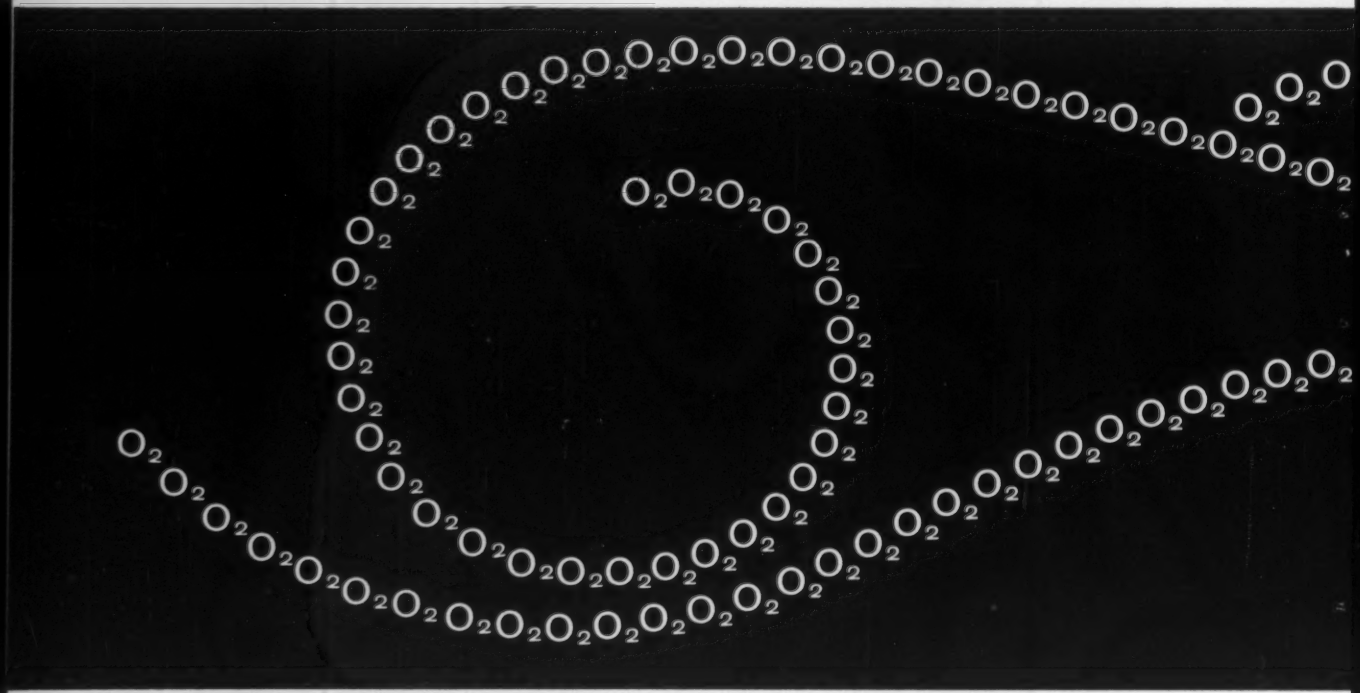
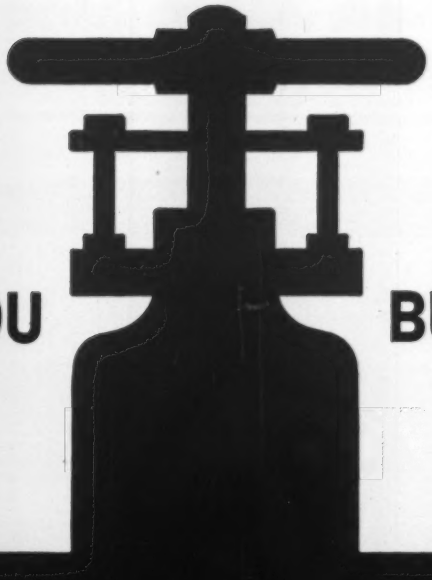
O_2

OXYGEN FOR STEEL IS ALWAYS ON TAP WHEN



Oxygen piped from a plant we build and operate, on or adjacent to your site, is backed by 45 years of experience in air separation. We have the resources and sound engineering ability to keep your



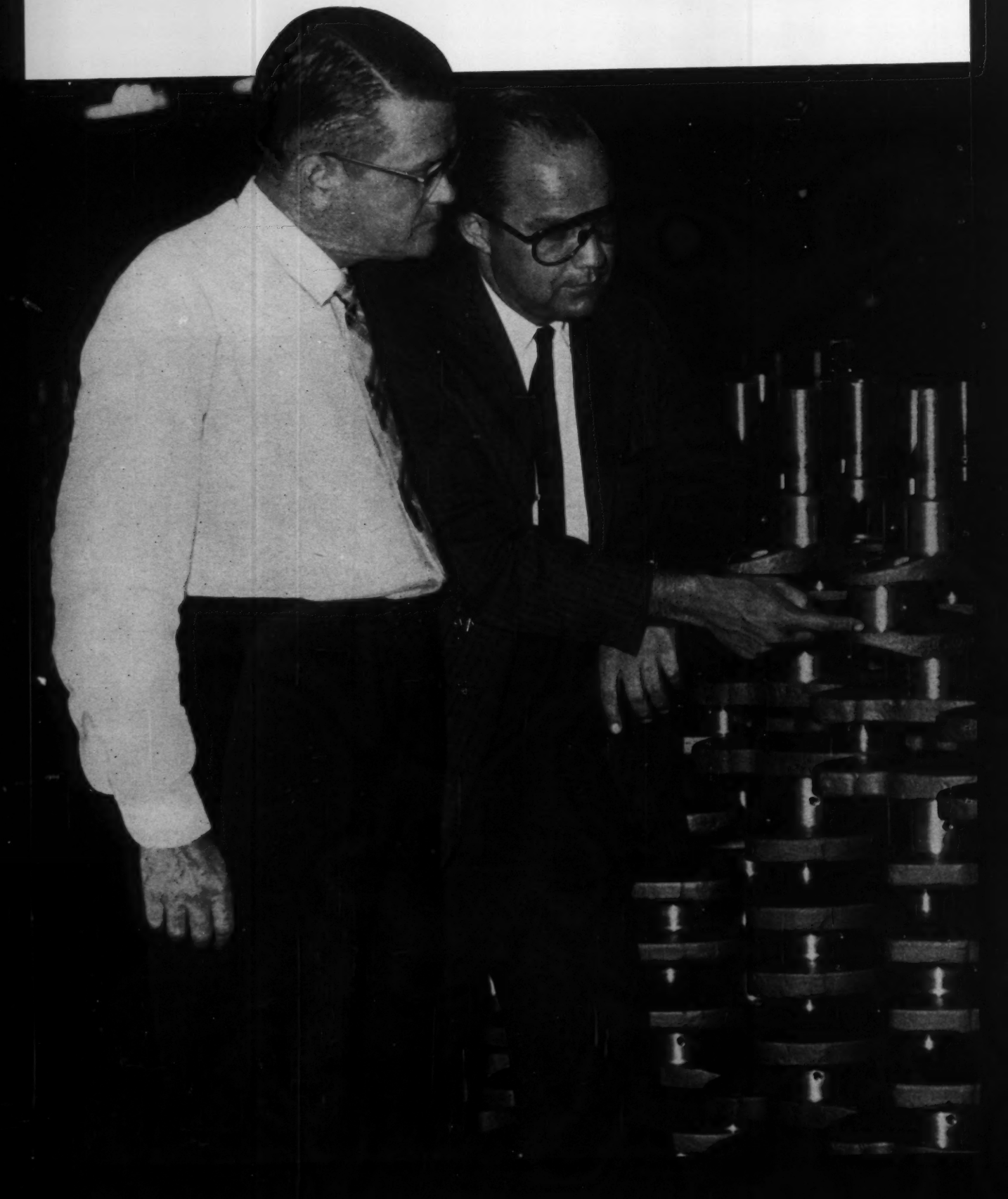
YOU BUY IT FROM AIRCO

oxygen flowing even if your needs increase.
For the full oxygen story, contact Airco.

AIRCO AIR REDUCTION SALES COMPANY

A DIVISION OF AIR REDUCTION COMPANY, INCORPORATED, 150 EAST 42ND STREET, NEW YORK 17, N. Y.
REPRESENTED ON THE WEST COAST BY AIR REDUCTION PACIFIC COMPANY

How Norm Nesbitt and Allen Moore



teamed up to cut dressing costs 50% at ATLAS CRANKSHAFT

This is a good example of the way it sometimes pays to break a habit even when it's a pretty *good* habit.

At Atlas Crankshaft Corp., in Fostoria, Ohio, the dressing wheels that are used to keep big crankshaft grinding wheels at peak performance play a very important part in maintaining production at a high and constant volume. There was nothing really wrong with the 6" dressing wheels Atlas had been using for years. They did a pretty good job and usually lasted through an 8-hour day.

But Atlas' Purchasing Agent Norm Nesbitt wasn't content with "good enough". He wanted "better" and had his eye firmly fixed on no less than "best". He got hold of Bay State representative Allen Moore and told him to go to work on the problem.

Moore is thoroughly accustomed to the kind of abrasive problems that require long and painstaking analysis. But this time, he found that it was a case of the solution being so simple that nobody had thought of it.

He simply recommended a larger dressing wheel . . . an 8-inch wheel instead of the 6-incher that was being used. Both wheels were stubbed at 4" but buying the larger wheel reduced the cost per cubic inch of usable abrasive 50% and cut the number of dressing-wheel changes from one a day to one every two days.

Not all abrasive problems are as easily solved as this one, of course. But the point of this case is both simple and important: The most obvious improvements in grinding operations are often the most difficult to spot. Your Bay State distributor and our direct representatives are thoroughly *trained* to spot the obvious and to *dig* for what is not obvious. You can't lose and you may well gain substantially by just turning them loose to analyze your grinding operations. *Better grinding at lower cost . . . that is their business.*

Atlas operator Paul Huff sets new 8" dressing wheel against surface of big, crankshaft grinding wheel. 8" diameter dressing wheel lasts twice as long as 6" wheel because both are stubbed at 4" and 8" wheel costs half as much per cubic inch of usable abrasive.

Norman Nesbitt, left, as purchasing executive for Atlas Crankshaft Corp. for 15 years, has encountered, and successfully met, every purchasing problem "in the book" . . . and then some!

Allen Moore, abrasive specialist, with many years experience with distributors and grinding wheel manufacturers, has a broad knowledge of abrasive wheel applications. His Business Administration degree attests to his awareness of cost-savings importance.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

precise tubing

In a wide selection of seamless and welded and drawn up to 1" O. D.

- Stainless Steel . . . Nickel . . . Nickel Alloys . . . Super and Exotic Alloys
- Glass-to-Metal Sealing Alloys
- Clad Metals and
- Composite Wires . . . Base and Precious Metals

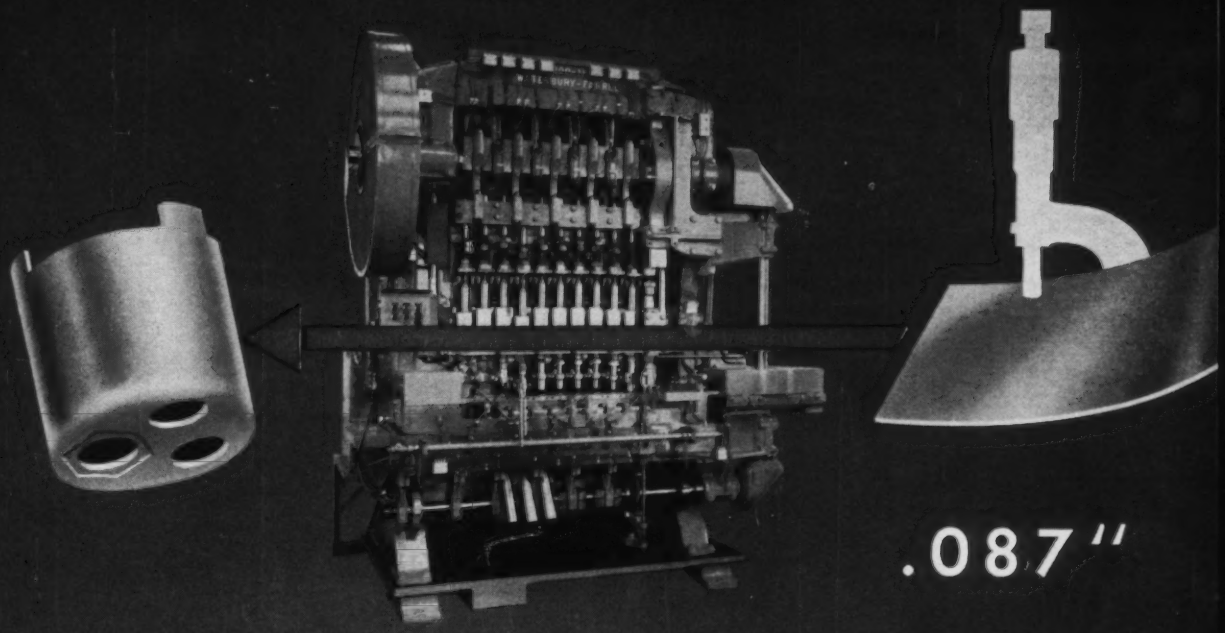
Write for Bulletin No. 12

BISHOP

Tubular Products Division **J. BISHOP & CO.** *platinum works* 30 KING STREET, MALVERN, PENNA.

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

OFFICES: NEW YORK • CHICAGO • ATLANTA • HOUSTON • LOS ANGELES



UP TO 70 FINISHED PARTS PER MIN.

From Heavy Gauge Strip On

WATERBURY FARREL CRANK EYELET MACHINES

Produce 50 to 70 complex, close tolerance parts per minute at low cost, from ferrous and non-ferrous strip up to .087" thick with Waterbury Farrel Crank Eyelet machines. In most cases, the parts are *finished* . . . no secondary operations required.

These rugged, multiple station machines are built in 4 sizes with from 7 to 11 operating stations. Blank diameters range up to 3¾" and the maximum shell length is 2 3/16".

These Crank Eyelet machines are part of Waterbury Farrel's wide range of both vertical and horizontal multiple station, transfer type machines which open the way to unprecedented economies in making parts from strip.

Investigate this modern cost-cutting production method by letting us analyze your drawings or samples.

WATERBURY FOUNDED 1851 FARREL

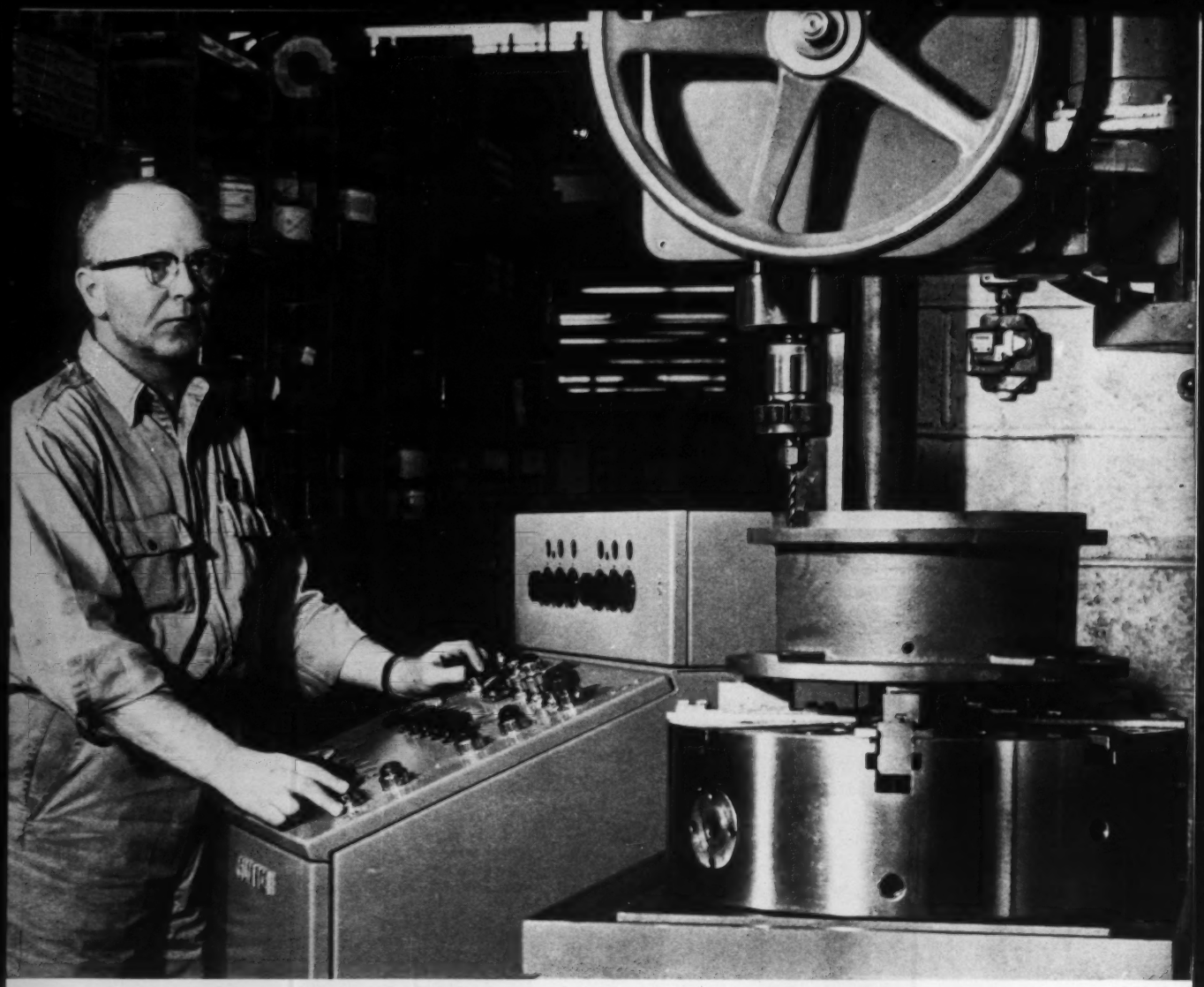
THE WATERBURY FARREL FOUNDRY & MACHINE CO.

DIVISION OF TEXTRON INC.

Waterbury, Connecticut, U. S. A.

Sales Offices: Chicago • Cleveland • Los Angeles • Millburn, N. J.

WF-79



NEW RELIANCE SYSTEM FOR AUTOMATIC POSITIONING OF MACHINE TOOLS

This drilling machine is operated by Reliance Programmed Numerical Control. It cuts the costs of lead time and expensive tooling. It provides fast, highly accurate positioning . . . electrical accuracy of ± .0001 inch and repeatability of .00001 inch can be achieved. This is an absolute system operating from a fixed reference with no cumulative error.

The Reliance drive operates feed motors at high speed until position is approached. Motors are then slowed down in proportion to the distance from the programmed point, stopping at the exact position. Any number of linear or rotary motions can be controlled simultaneously or individually for complete automatic operation. Provision is also made for programming auxiliary functions, such as turret selection, clamping and coolant control.

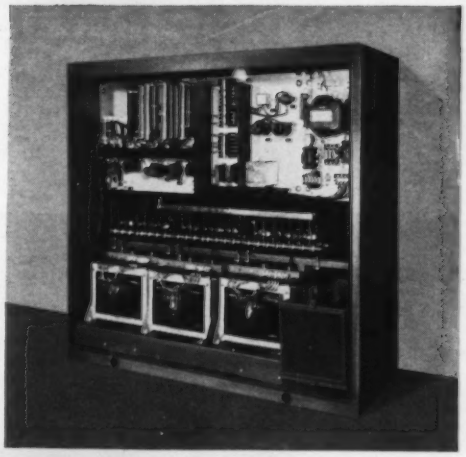
Reliance Programmed Numerical Control uses 8-channel machine tape or dial selector switches for input. Operates from standard tape processing and reading equipment.

It will pay you to get the complete facts about this equipment. Your Reliance Sales Engineer has all the information. Consult the Yellow Pages or write us direct.

A-1636

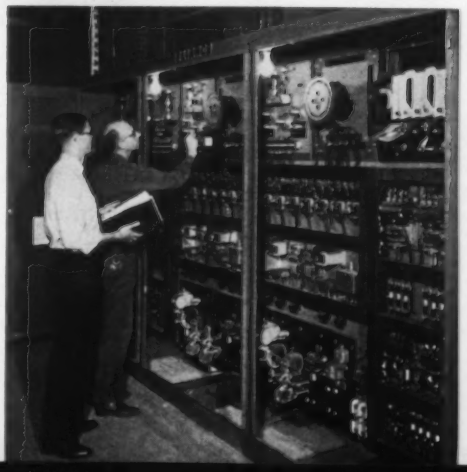
RELIANCE...builders of the tools of automation

NEW DUTY MASTER D-5000 design brings you new standards in coolness, quietness . . . and more horsepower in less space. Frame dimensions that held 150 hp. now contain 300 hp. There is better heat dissipation from the frame itself. Air flows easily through the entire grilled end areas—exhausts through long, protected slots at the sides and bottom. New fingerless ducted rotor design means better cooling than any other previous motor. You get all famous Duty Master features in this new D-5000 . . . special lubrication design, drip or splash-proof and complete open motor protection. Bulletin B-2515.



RELIANCE V★S STATATRON is a static powered drive for wide range variable speed from in-plant a-c. circuits, available from 1 to 200 hp. Instead of a motor-generator set, the Statatron uses silicon diodes and saturable reactors to rectify the current from a-c. to d-c. These work in combination with a transistorized power exciter to supply variable voltage. Statatron is compact—35% smaller than conventional units. Consists of only three components: Super 'T' d-c. motor, operator's station and control cabinet. Statatron is quiet—vibrationless and low in maintenance cost. Bulletin D-2508.

THIS MASTER GEARMOTOR drives a chip conveyor on an automatic screw machine. The combination parallel and right angle reduction produces efficient low output speed at high torque —ideally suited to this operation. Features important here are its compactness and one piece construction, saving space and maintenance. This Master Gearmotor is impervious to liquids . . . splashing of coolant and any other outside contamination. Where the situation calls for gearmotors, this full line can cut your engineering and assembly costs . . . give you dependable performance. Bulletin E-2409.



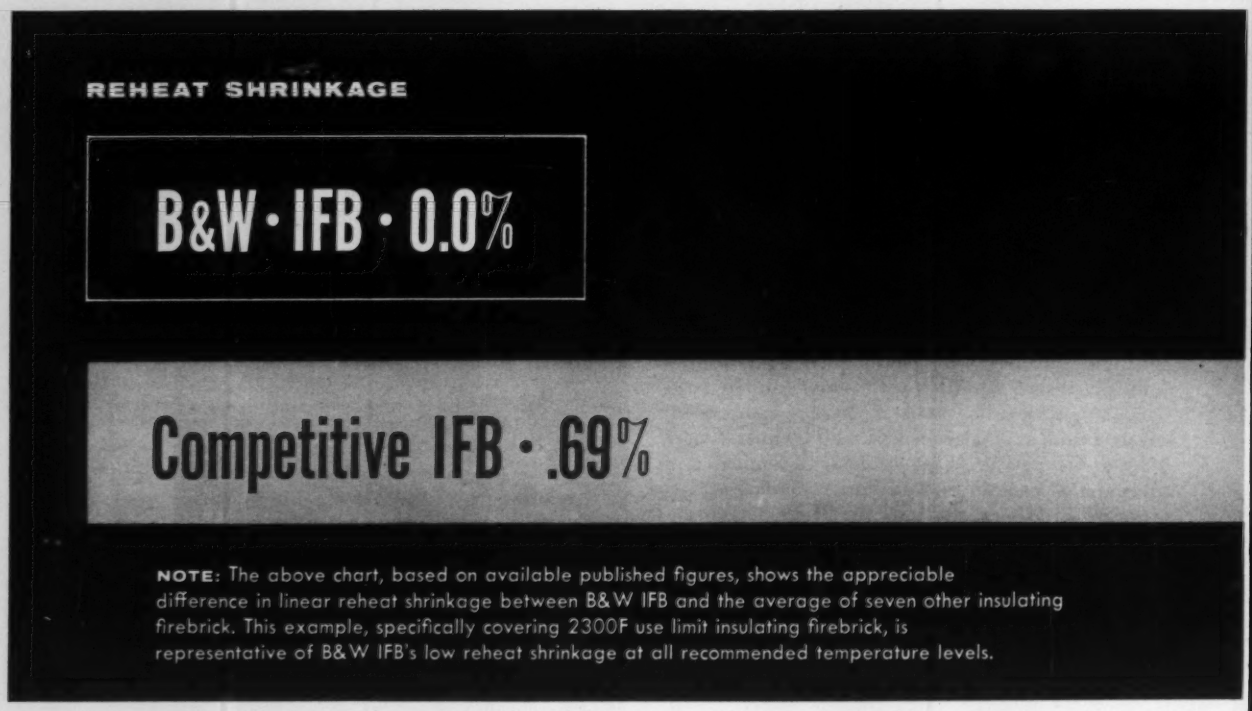
TOTAL SERVICE is an integral part of every Reliance product, from engineering and start-up assistance to maintenance and renewal parts. The photo shown here is typical of a Reliance Service Engineer's on-the-job availability—for maintenance and consultation on knotty problems. Every Reliance Sales Engineering Office and Distribution Center—nationwide—gives you the attention and experience necessary to assure the top performance you expect from the Reliance equipment you buy.

RELIANCE ELECTRIC AND ENGINEERING CO. •

DEPT. 44A, CLEVELAND 17, OHIO • Canadian Division: Toronto, Ont.

Another *plus* of Lightweight B&W Insulating Firebrick

LOWER REHEAT SHRINKAGE means MORE STABLE



NOTE: The above chart, based on available published figures, shows the appreciable difference in linear reheat shrinkage between B&W IFB and the average of seven other insulating firebrick. This example, specifically covering 2300F use limit insulating firebrick, is representative of B&W IFB's low reheat shrinkage at all recommended temperature levels.

All insulating firebrick are not the same. Published figures show wide variations in *all* of the important properties among the leading brands of brick.

Take reheat shrinkage. This important property affects furnace stability, refractory life and fuel costs. Reheat shrinkage ranges from a B&W Insulating Firebrick low of 0.0% to a high of 1.5% for competitive insulating firebrick. The closest any other IFB comes to matching B&W IFB is 0.3%.

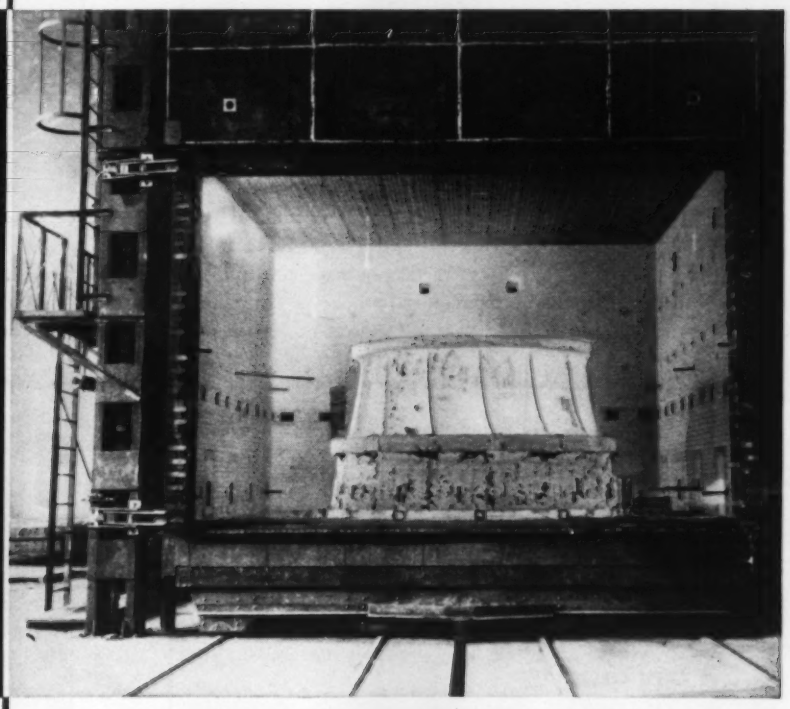
You are paying for insulating firebrick . . . make sure you get *all* the benefits. B&W—the originator of IFB—manufactures a full line of IFB with an experience-proved balance of light weight, high insulating value, high strength and long life.

For complete information on B&W Insulating Firebrick, write for Catalog R-38 to The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, New York.

ONE OF A SERIES

FURNACE CONSTRUCTIONS

the payoff



Stability means low maintenance —

This large car bottom annealing furnace has given years of low maintenance service because of the stability of B&W Insulating Firebrick. Furthermore, the high insulating properties of B&W IFB have resulted in lower fuel costs and close temperature control. This is just one of many proofs in our files that "there is an important difference in insulating firebrick."

B&W

THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

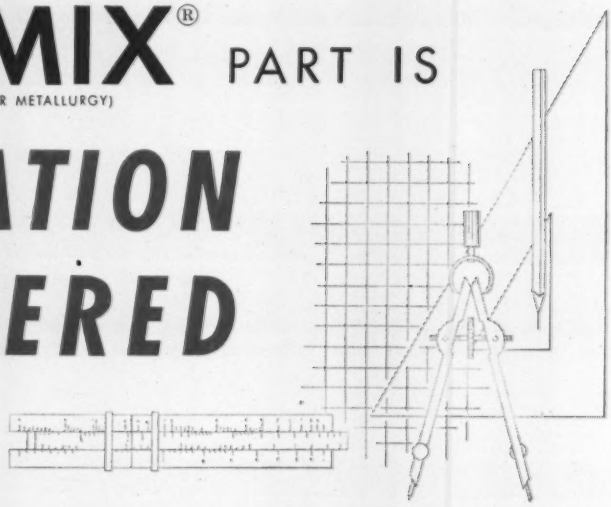
R-660

TO INSURE SUCCESSFUL PERFORMANCE

EVERY GRAMIX® PART IS

(PRODUCTS OF POWDER METALLURGY)

APPLICATION ENGINEERED

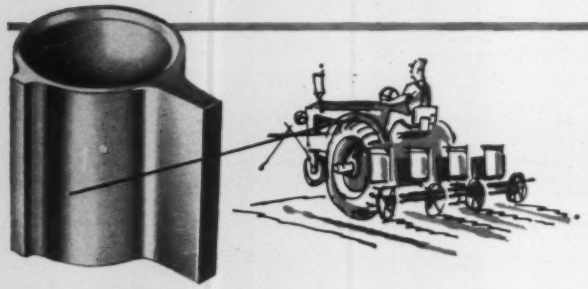


One of the most important factors to consider when purchasing powder metal parts is that of successful part performance; for a part to successfully perform its job, all of its physical and metallurgical characteristics must be suited to the application.

GRAMIX Products of Powder Metallurgy are always *Application Engineered,* which means product is specially matched to each specific application. From an almost unlimited variety of metal mixtures, one alloy is blended that contains the required properties and characteristics of the finished part; *all* aspects of part design and conditions under which it must operate are taken into account. Only then is the GRAMIX part produced.

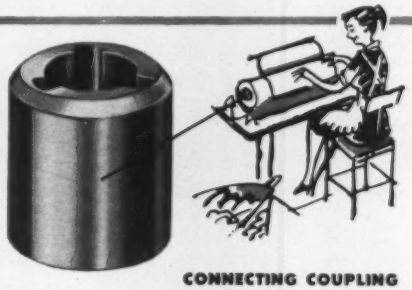
Eight of these *Application Engineered* GRAMIX parts are shown here. Each precisely suits the requirements of its job . . . each is the best part available for the job.

When you specify a GRAMIX part, you can always be sure that it has been *Application Engineered* for successful performance, long life and complete reliability. For more information on *Application Engineered* GRAMIX parts, write for Engineering Handbook G-55.



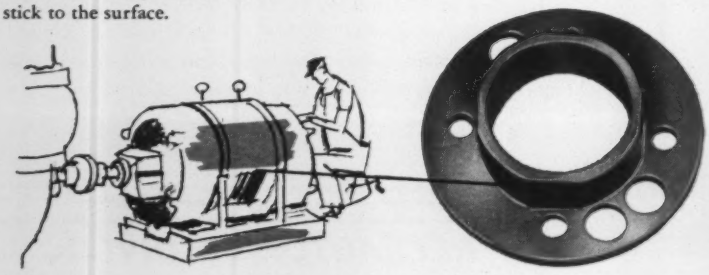
CORN SEEDER

GRAMIX was the material specified for this corn seeder part because the surface finish obtainable with the alloy used reduced the tendency of material to stick to the surface.



CONNECTING COUPLING

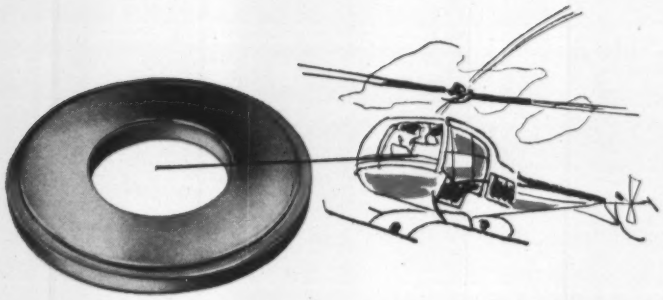
The connecting coupling employed in a small home ironer is formed from a special GRAMIX hardened steel alloy; it offers low wear and shock resistance.



CONTAINER COVER END CAP

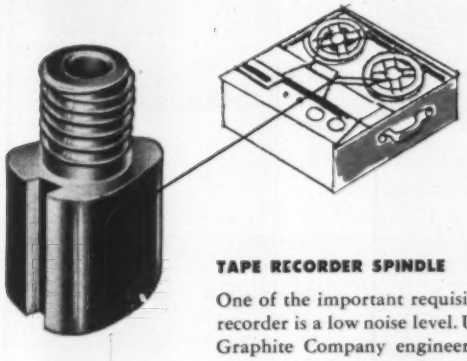
Great savings were realized when retainer caps for certain types of electric motors were made of GRAMIX.

This process made it simple and economical to mold the multiple holes to precise tolerances without extra operations.



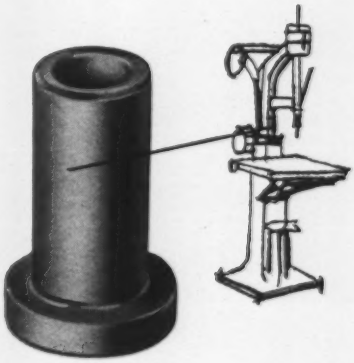
HELICOPTER THRUST WASHER

The outstanding features of the GRAMIX alloy specified for this thrust washer are a dependable and consistent friction and wear pattern as well as a fine surface finish.



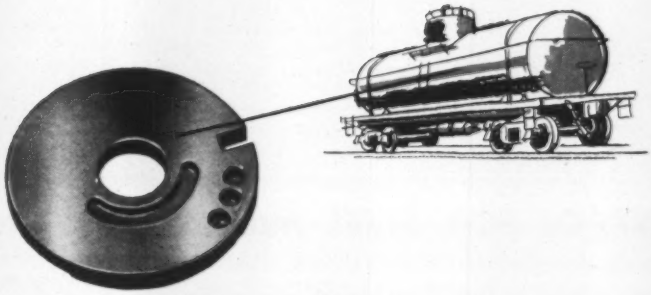
TAPE RECORDER SPINDLE

One of the important requisites in a tape recorder is a low noise level. United States Graphite Company engineers developed a special alloy to meet these requirements in the GRAMIX spindle.



GUIDE BEARING

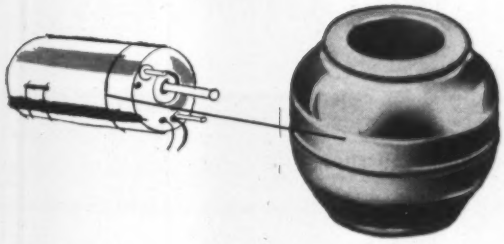
Built-in lubrication and low friction to reduce heat are important features of the GRAMIX alloy chosen for this guide bearing.



LIQUID PUMP END PLATE

This end plate is typical of many parts employed in liquid pumps of many types.

It is made from a wear resistant bronze alloy that was developed for pump applications.



FRACTIONAL H.P. MOTOR

The GRAMIX bearing for this Fractional h.p. motor was developed from a special low noise level alloy.

Its self-lubricating properties were also an important consideration in specifying GRAMIX.

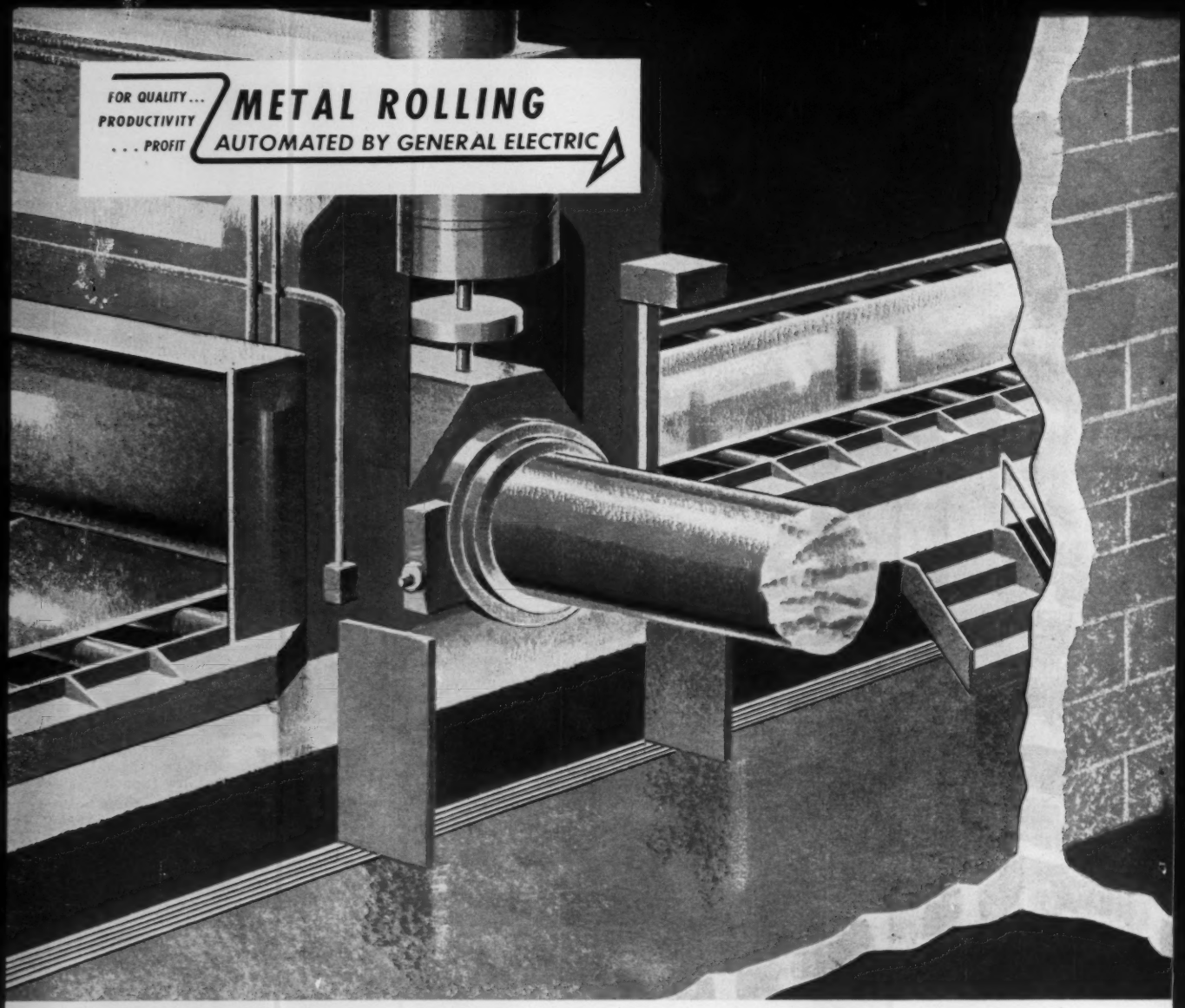
METAL POWDER mpi INDUSTRIES FEDERATION

X-296-2

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 18, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDER METALLURGY • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES



GENERAL ELECTRIC CONTROL FOR STEEL MILLS

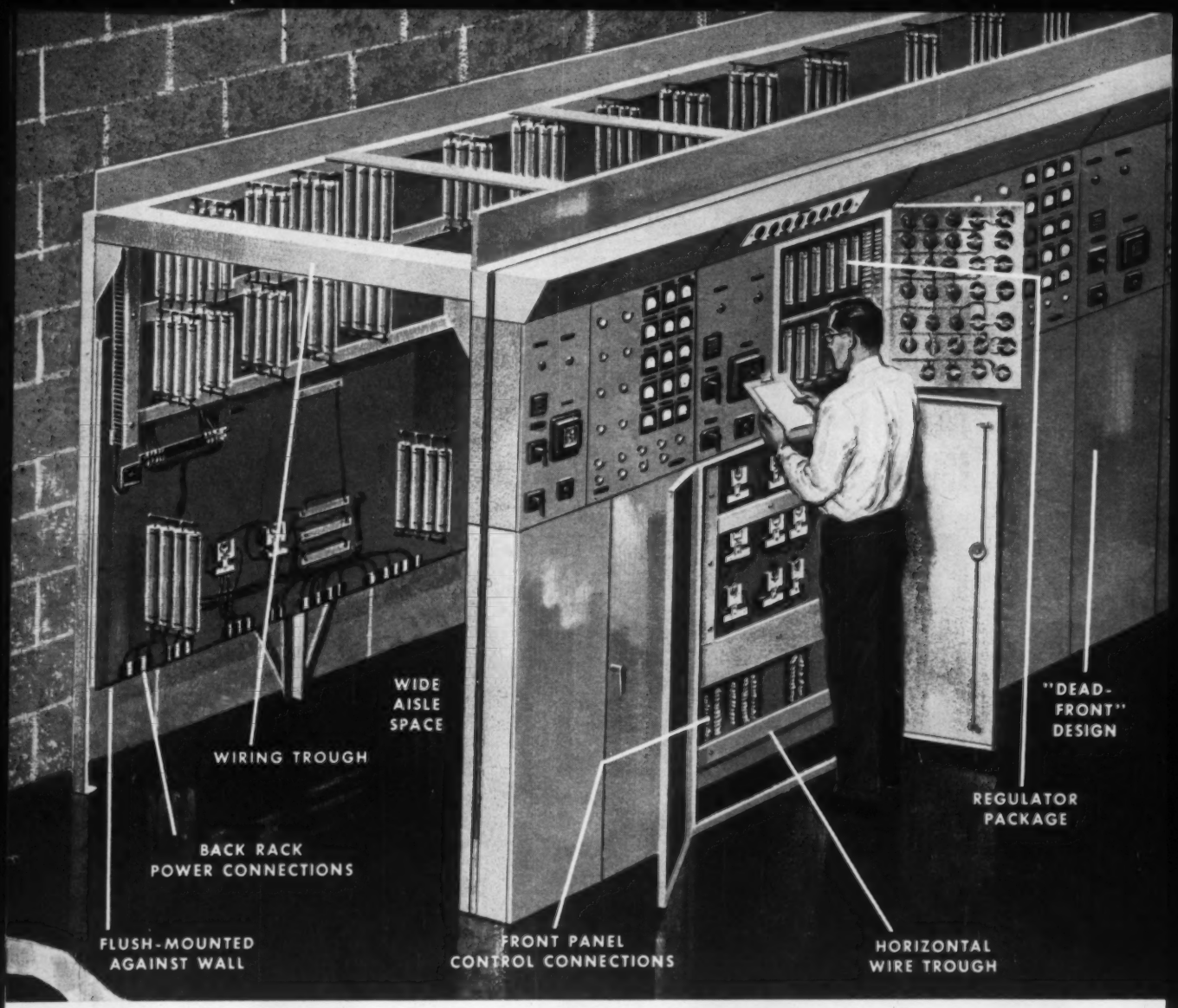
New control panels cut connection

General Electric has redesigned its industry-proved, heavy-duty, steel mill control panels—adding features to permit greater utilization of mill space . . . to save you time and money in installation and maintenance . . . and increase safety for operating personnel. The following cost-cutting and work-saving benefits tell the story of these new panels:

Reduced floor space—Compact design of this new panel cuts floor space needs up to 35 percent. More efficient arrangement of components provides added room for work inside the panel, yet reduces panel length. All incoming wires for control terminate at the front of the panel. All power wiring, including customer power connections, is isolated on the back rack. Use of welded studs and cage nuts permits installation against a wall —no need for additional work space behind panel. This saving in space means that valuable floor area can be used for other purposes, or construction costs of new buildings can be reduced.

Easier field connections—Installation wiring time is reduced as much as 50 percent by improved wiring lay-out. All incoming control wiring is brought to the front of the panel. A horizontal wire trough is available to the contractor to facilitate wiring to proper terminals and eliminate cord-tying bundles of wires in the field. Doors on the front of the panel open for access to terminal boards. For quick identification, terminal designations are permanently ingrained on the terminal board and into high-quality, plastic sleeves on each wire end.

Simplifed maintenance—Wide aisle between front panel and back rack makes maintenance easier and safer. Devices on front panel and back rack are connected *from the maintenance aisle,* allowing work from only



time 50%, required floor space 35%

one location. On the regulator package, fine-tuning adjustments are easier since potentiometers are located next to their related meters.

Increased safety—Since power wiring and all field power connections are isolated on the back rack, operating personnel are protected from accidental contact with high voltage. "Dead-front" construction, utilizing regulator packages and front panel devices behind doors, affords additional protection.

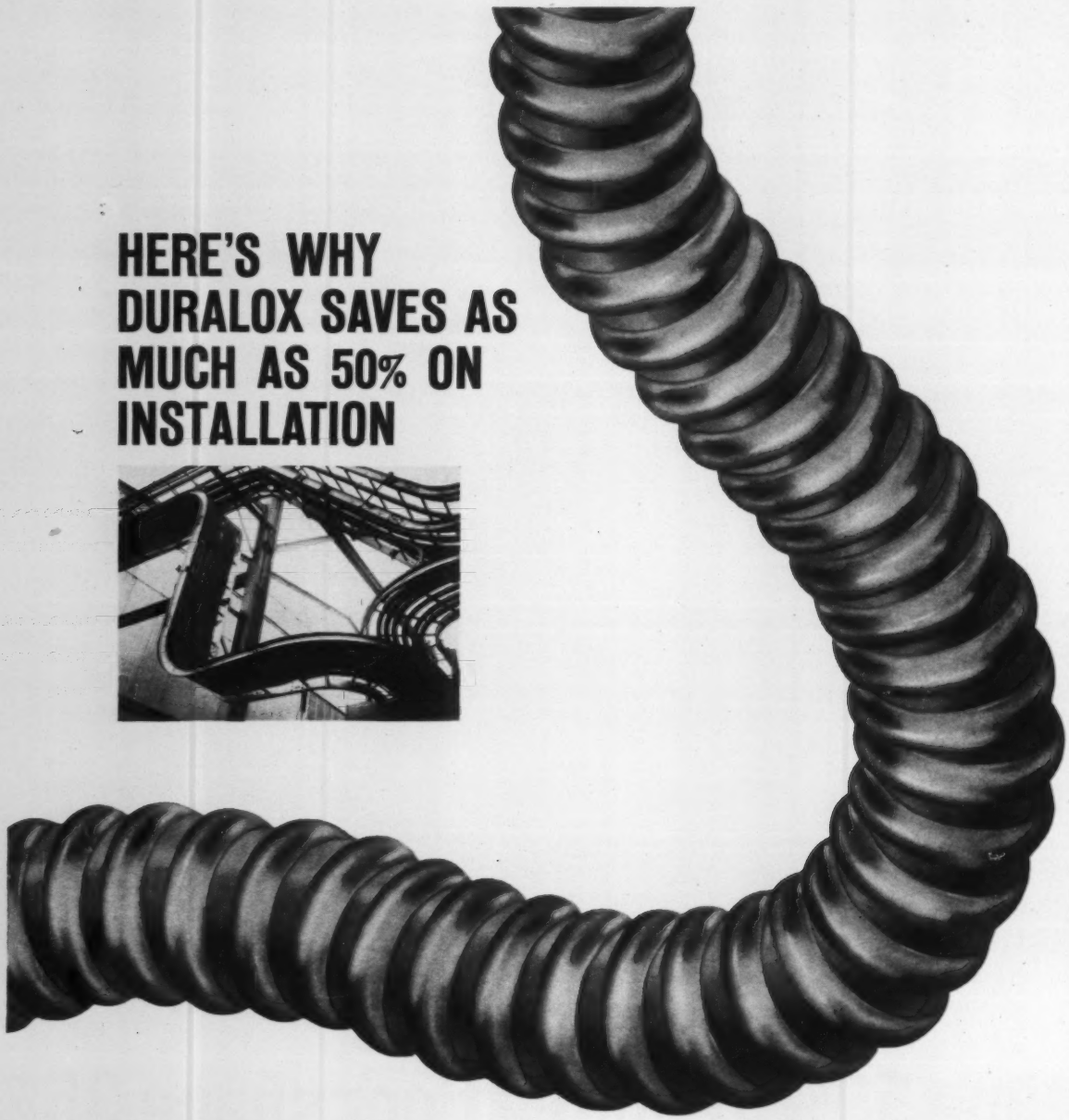
Improved appearance—All-steel bases provide rugged construction and uniform panel shape. Packaging of equipment into functional components and placement of contactors and relays behind doors give straight-line, modern appearance to panels.

For details on these steel-mill control panels, see your G-E Sales Engineer. Or write Sect. 785-13, General Electric Co., Schenectady, N. Y. for Bulletin GEA-6701. *Industry Control Dept., Salem, Va.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

HERE'S WHY DURALOX SAVES AS MUCH AS 50% ON INSTALLATION



You save time . . . you save money . . . you save manpower —with Anaconda butyl-insulated Duralox.* *For Duralox has its own conduit of durable, yet flexible, metallic armor.*

This means fast and easy installation in long runs over and around obstructions, in trays, indoors or out—and all without the expense, trouble and time of laying rigid conduit and pulling cable through it.

Duralox will fit into your long-range plans as well—because it's 100% salvageable and can be readily moved as your plant layout changes.

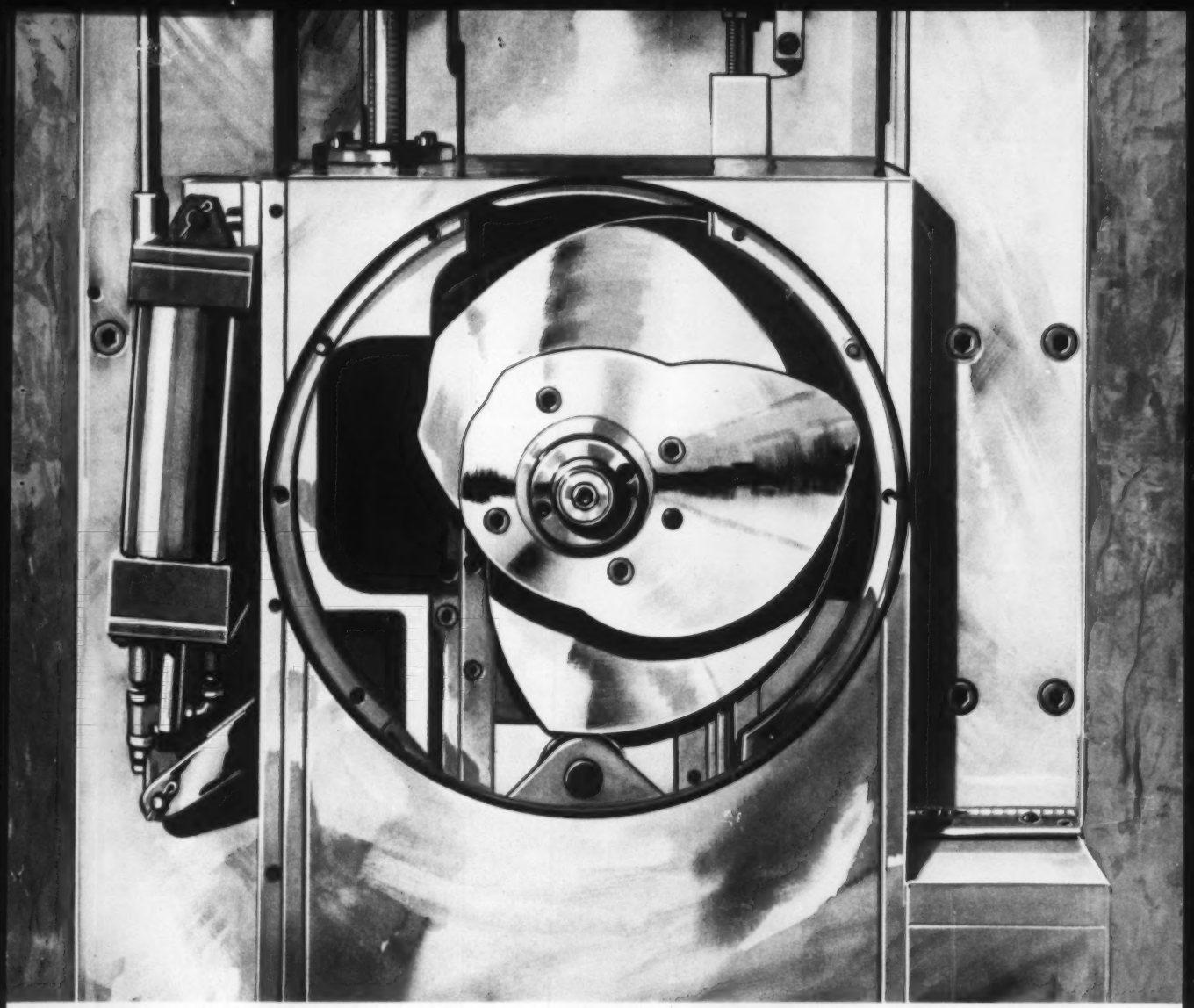
Duralox's lower reactance—because of the close spacing of the conductors—results in reduced voltage drop and more efficient power distribution. Available in ratings of 5 kv, 15 kv, and higher, in addition to lower voltage ratings.

Whether your problem is wiring a new plant or rewiring an old one—see the Man from Anaconda. Duralox is just one of the many types of Anaconda wire and cable that can help you increase plant flexibility . . . reduce operating costs . . . bring in new power for your needs today and tomorrow. For full information on Anaconda Duralox Cable write for Bulletin DM-5606 to: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Reg. U.S. Pat. Off. 61261

Duralox has Anaconda Butyl (AB) rubber insulation
for • extra-high resistance against ozone
• exceptional moisture resistance
• 22% more current-carrying capacity
than 70° centigrade insulation

SEE THE MAN FROM
ANACONDA®
FOR BUTYL-INSULATED
DURALOX POWER CABLE



Exclusive New Britain design
for greater boring accuracy

This is the vertical slide of one of the new series New Britain Vertical Contour Turning and Boring Machines with the front plate removed exposing the cams. These cams are mounted on a common shaft which rides with the vertical slide controlling its motion as well as the motion of the cross slide. Containing all slide actuating forces in the vertical slide is an exclusive New Britain feature which represents a major development in boring machine design.

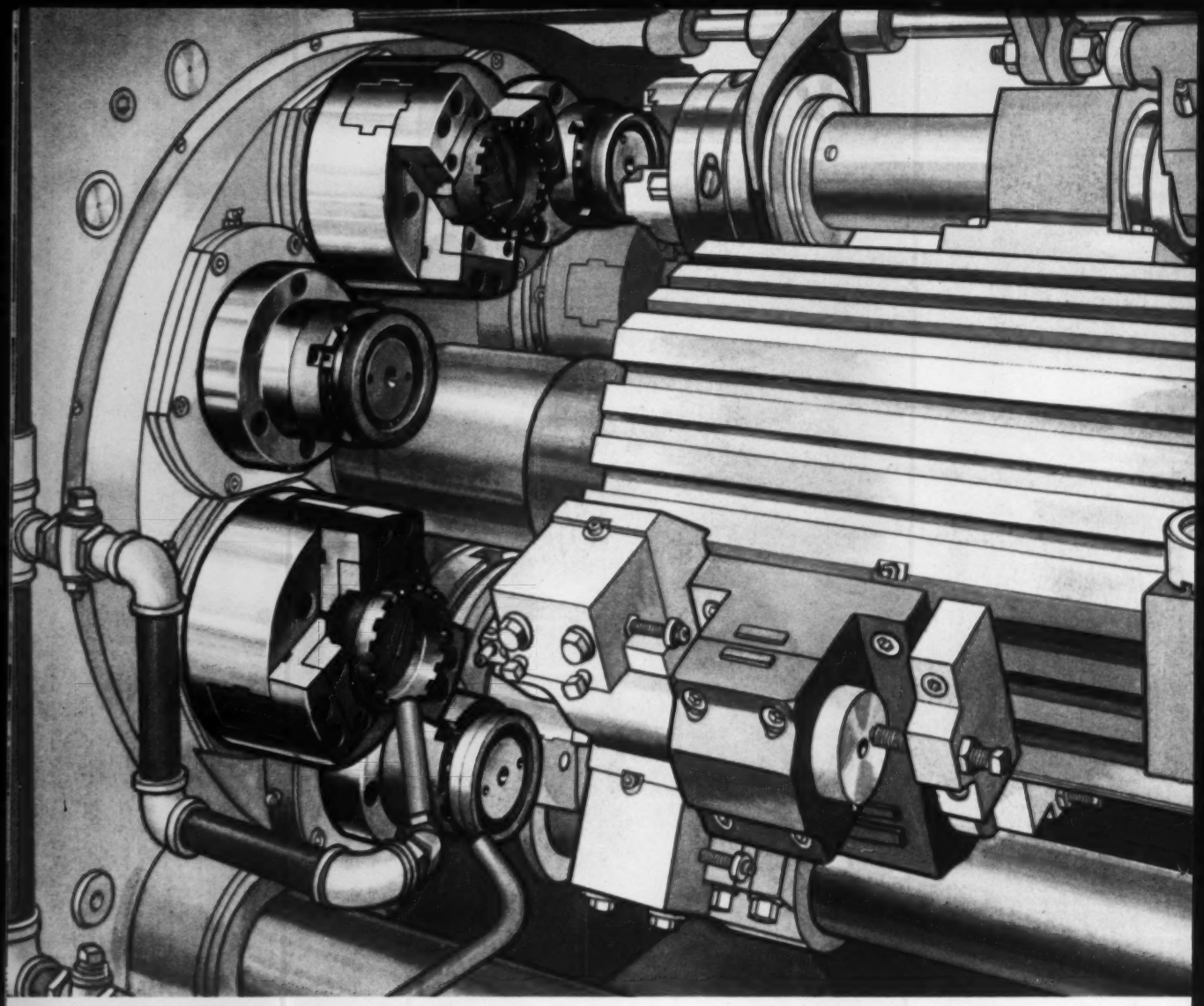
No outside forces are imposed on the slide ways. Extreme accuracy and rigidity are achieved permitting heavy cuts. Finish cuts of less than .0003 tolerance can be made on the same set-up.

The elimination of long actuating linkages has allowed for the design of a compact, clean sided, simplified machine. Cams are quickly accessible and easy to change.

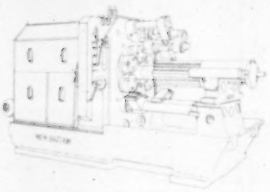
The major improvement which the cam-in-head principle makes on the already widely accepted superiority of cam control results in high repetitive accuracy regardless of the complexity of the piece. Building-block applications, using more than one machine side by side, allow all kinds of possibilities for increased production efficiency.

THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division ◆ New Britain, Connecticut



Double indexing... differential chucking pressures *with New Britains*



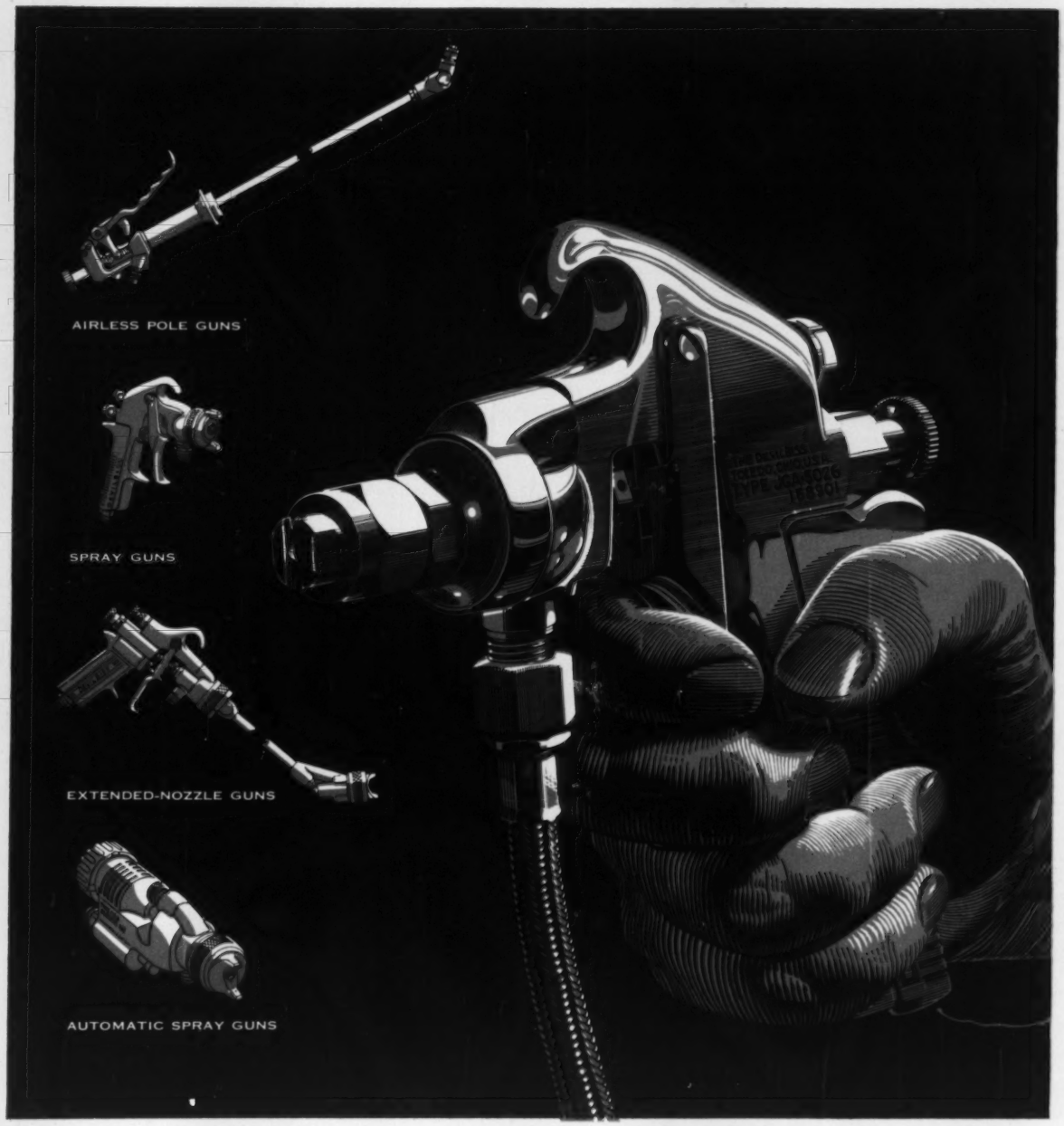
Here are two features that go a long way toward indicating how much and what kind of work you can do on New Britain's Chuckers. The double indexing feature is a really workable approach to the production of two identical pieces per cycle or both sides of a piece. This application can frequently eliminate the need for second-operation machines. Chucking pressures can be adjusted so that as the machine progresses through the cycle, and more and more metal is removed, the piece will not be distorted.

These are only two of a dozen different New Britain Chucking Machine features. These rugged, powerful machines are your best bet for high production turning, forming, facing, threading, tapping and related operations. New Britain's complete line of chuckers includes four-, six- and eight-spindle models, with work swing up to 17 inches. Wide open design in all models allows for the quickest possible disposition of chips.

Make a point of calling in your New Britain representative soon. Let him show you the dollars and cents reasons for including New Britains in your replacement or expansion plans.

THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division ◆ New Britain, Connecticut



spray guns from DeVilbiss apply almost anything that pours—far faster than any contact-application methods. They're part of DeVilbiss' complete line of matched equipment for coating and finishing, that includes: dip and flow coaters, air compressors, air and fluid hose, spray booths, industrial ovens, spray washers, air-replacement units, dust collectors, "turn-key" finishing systems.

Talk to DeVilbiss about all your spray-coating requirements

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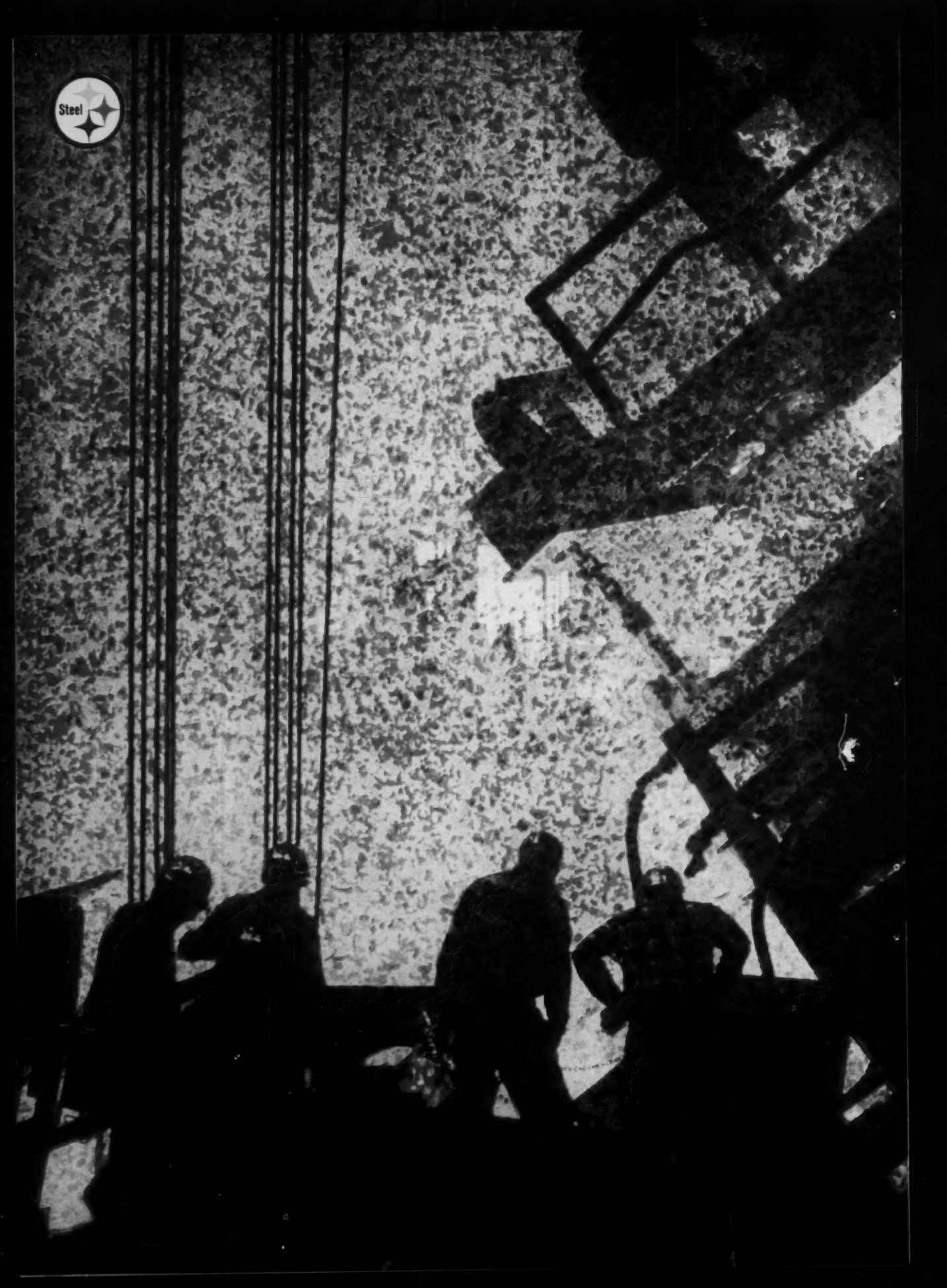
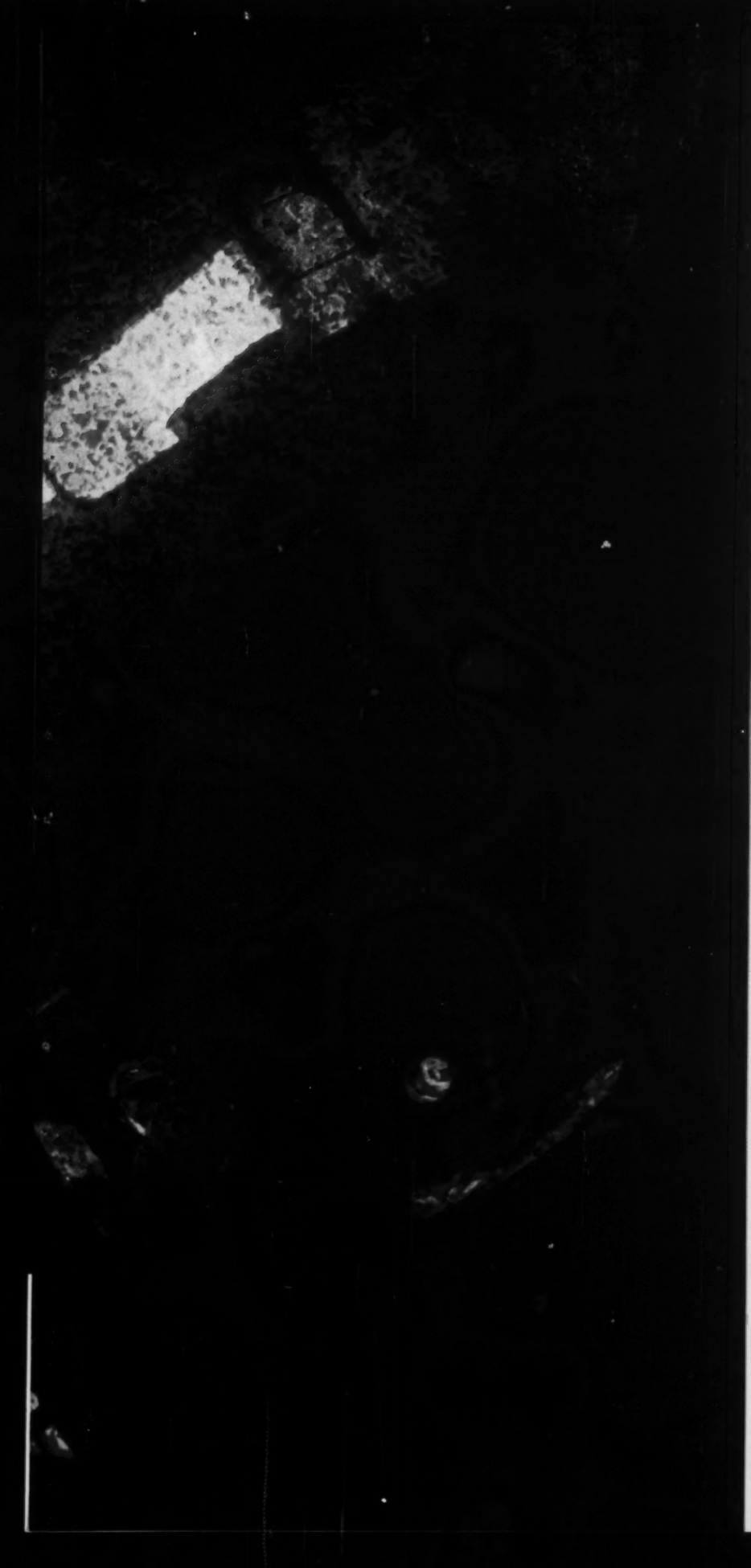
THE DeVILBISS COMPANY, Toledo 1, Ohio. Also Barrie, Ontario; London, England; São Paulo, Brazil. Branch offices in principal cities.


Steel



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Of a steelmaking specialist. To be a step ahead. In equipment. In versatility ■ Tilt the mammoth electric furnace. Pour the molten stream. Steels for bridges, missiles, refineries and a host of other industrial uses. From a modern electric furnace comes the vast variety of special-duty steels essential to the skilled builders of such vital projects ■ The urge for versatility and product range is a characteristic long associated with Lukens in the making of plate steels. Carbon steels by the thousands of tons. Special-duty clad and alloy steels. Armor steels. Heads and steel plate shapes. It is one of many characteristics that make Lukens—

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IN PLATE STEELS

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COATESVILLE, PA.

PHOTOGRAPH BY PAUL WELLER

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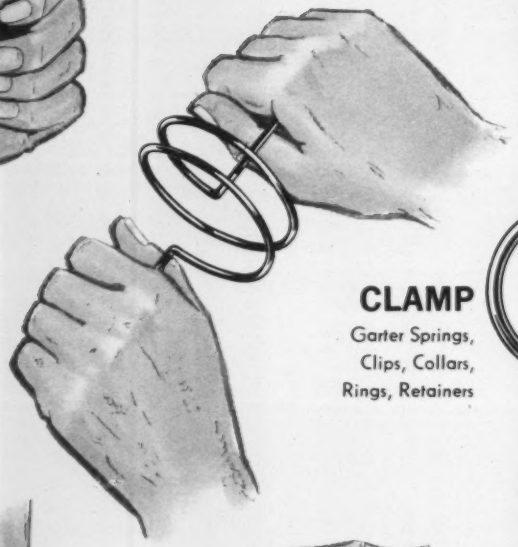

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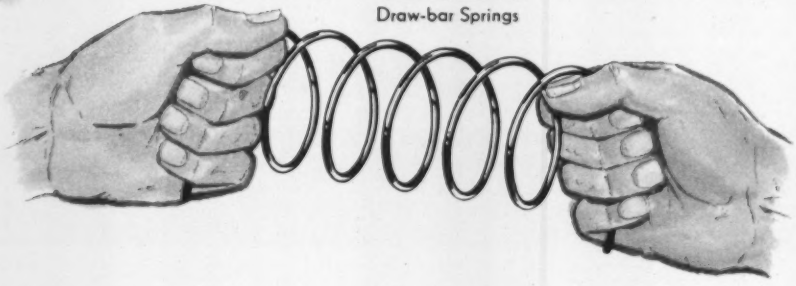

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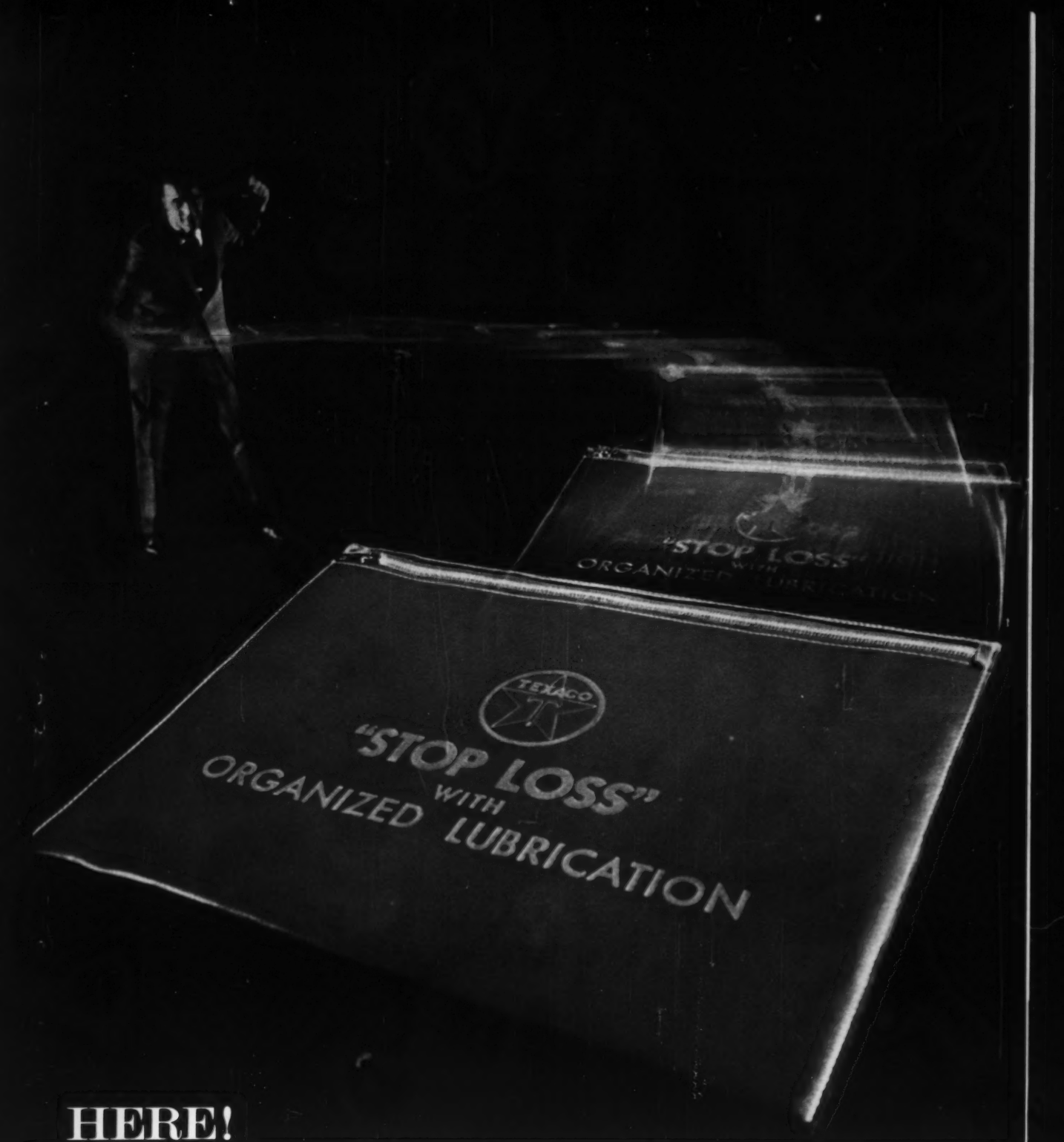

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ADD UP TO 4% TO YOUR NET PROFIT

Caught in a profit squeeze? The contents of the Texaco man's briefcase can help you do something about it. Inside is Texaco's "Stop Loss" Program. It's a new cost control tool that can knock as much as 15% off your maintenance costs by showing you how to organize your lubrication. You can tack this saving directly onto profit—for an average 4% net gain. It will pay you to get the details. Write for our folder "How to Starve a Scrap Pile." **TEXACO** INC., 135 East 42nd Street, New York 17, N. Y. Dept. S-181

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MAIN OFFICE AND MANUFACTURING PLANTS

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- more rigid support of tool
- more rigid support of work
- less setup time
- centralized control

NEW

3-way bed lathe offers 4 big advantages

With this new Farrel-Betts design, *there is more rigid support of the tool* because the cutting-force resultant falls between the front and middle ways.

There is more rigid support of the work because it is not necessary to extend the tailstock quill, to reach across the carriage bridge, in facing the end of the workpiece. The carriage will pass completely by the tailstock.

The ability of the carriage to pass the tailstock, as well as the steadyrests, also results in *less setup time.* This is particularly effective when two carriages are used on long lathes.

From the carriage, the operator has finger-tip, *centralized control* of all operations.

The carriage is arranged for application of numerical and/or tracer control and electric thread cutting. The new "Rotorak" feed incorporates a sectional threaded rack with a pair of large, adjustable screws for backlash control. As the rack sections are short and accurately spaced, there is no limit to the length of bed that can be supplied. The new carriage feed system eliminates the need for a lead screw, rods, shifter mechanisms, etc. Result — A cleaner machine, less maintenance and less operator distraction.

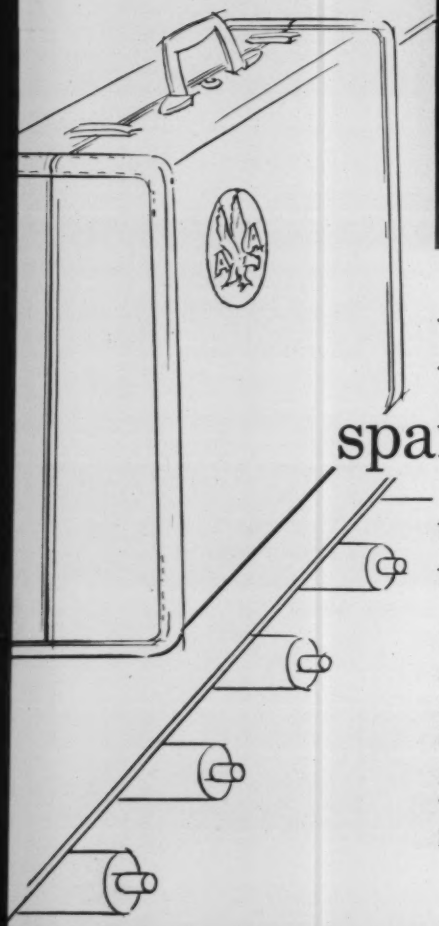
These outstanding new lathes are made in sizes ranging from 32″ to 92″ swing over the bedway. Write, wire or phone for answers to any questions you may have.

FARREL-BIRMINGHAM COMPANY, INC.
CONSOLIDATED MACHINE TOOL DIVISION
565 Blossom Road, Rochester 10, New York
Telephone: BUtler 8-4600

FARREL BETTS®

CM-64

One Logan belt conveyor runs behind the American Airlines ticket desks, full length of the new terminal's 200-ft. main lobby. Ticket agents weigh and tag baggage and place it on this continuously-running line. Stainless steel kick plates give the conveyor an attractive built-in appearance and prevent accidents.



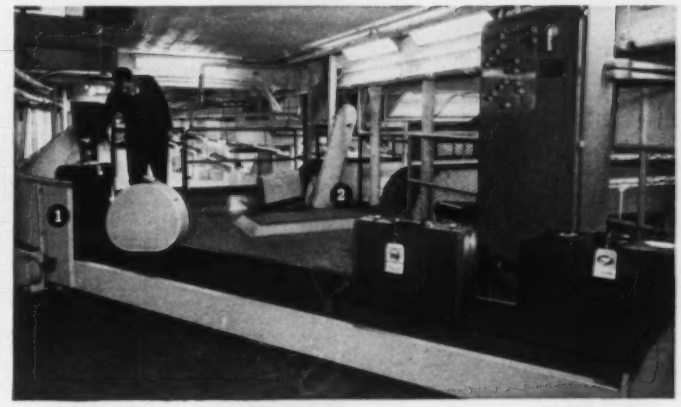
Logan *Plant Dynamation* sparks air baggage to jet pace

through the new American Airlines terminal at Idlewild

Like modern production machines, modern jet passenger planes call for new approaches to material handling. Photos on these pages show how a 700-ft. Logan *Plant Dynamation* conveyor system helps keep the baggage of 2800 daily passengers in pace with fast schedules. This feature of American Airlines' jet terminal at New York International Airport is part of the hemisphere-wide "Baggage Expediter System" for 707 Jet Flagships. The Logan conveyors have a peak capacity of 1500 parcels per hour—over 18 tons of baggage.

One chute conveyor and two inclined belt conveyors lower bags to ground level points where final sorting takes place. Bags actually enter jet planes in the molded fiber "pods" seen on the right. The movable Logan conveyor in the background quickly returns to the junction platform any bags requiring re-routing. Total time from lobby to flight pod: about five minutes.

Much outbound baggage arrives by bus and limousine. These parcels are lowered by a combination chute and belt conveyor line, direct from the terminal's front ramp to the baggage sorting junction.



One level below the main lobby, all baggage enters a suspended junction platform area where it is sorted by flight and dispatched to proper loading areas. In the photo above the conveyor from the lobby is numbered 1, the line from front ramp numbered 2. The Logan control panel at right monitors and controls the entire conveyor system.

Why the leaders of so many industries call in "The Man From Logan"

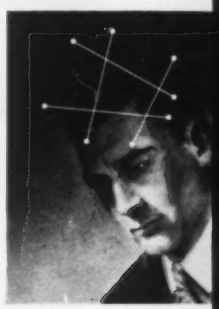
Whether your problem is more like pacing suitcases through a terminal, appliances through assembly, or cookies through a bakery, the Logan field engineer takes hold like a specialist in *your* type of conveyors. There is a reason:

The Logan technique of Plant Dynamation cuts straight to the heart of any process and the individual needs of any plant. The Logan engineer helps you analyze your plant's *basic work-power patterns* . . . then moves step by step to design the one right conveyor system dictated by these patterns.

Over the half-century in which assembly-line production itself has grown up, Logan engineers have developed and proved the Plant Dynamation concept through thousands of custom installations, in a very wide range of fields. All this experience is focused on your job. On an average, "The Man From Logan" stationed near you has fourteen years of Logan training and experience.

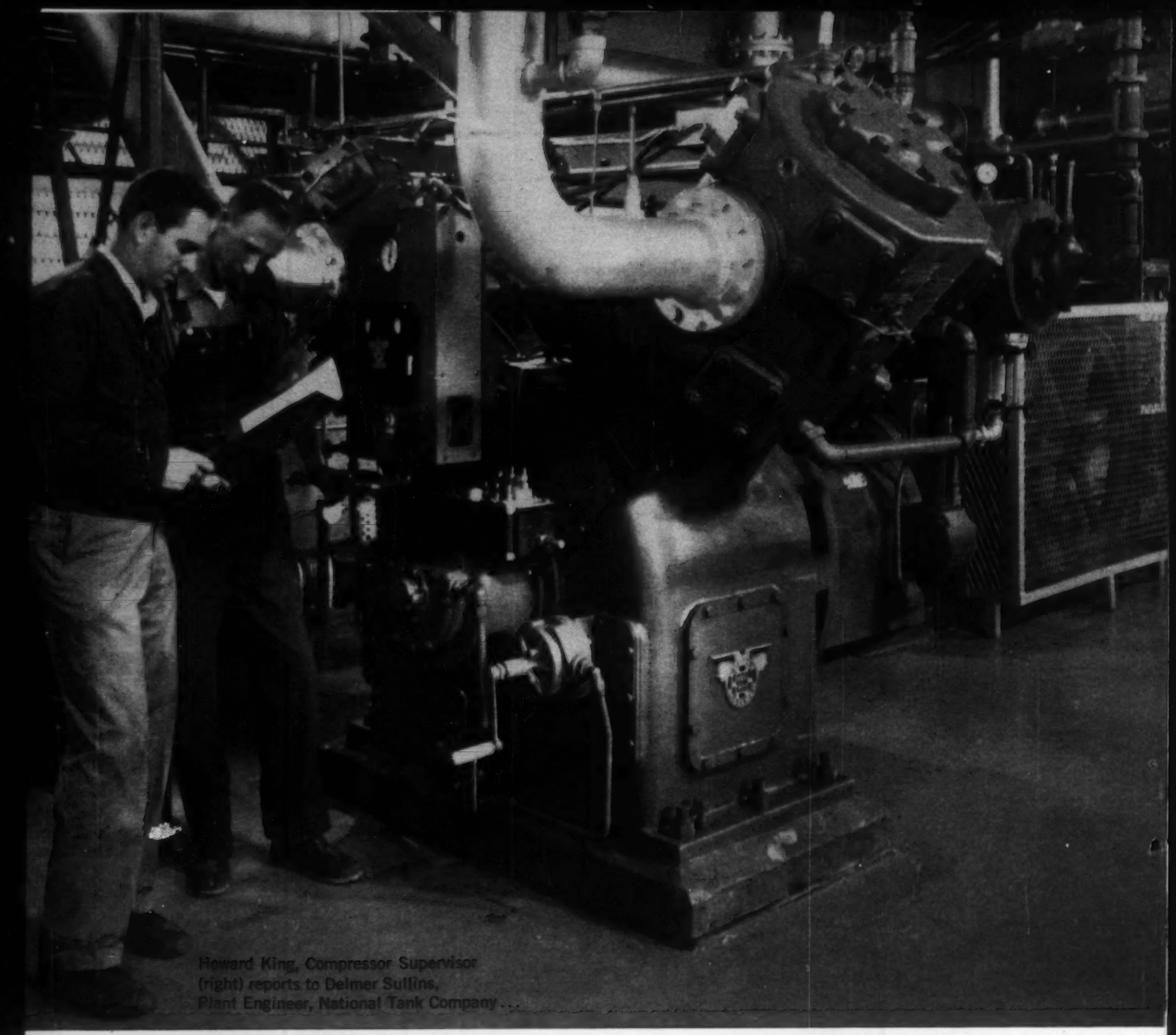
One of the most comprehensive lines of conveyor equipment permits the Logan engineer to specify the one right system for you in every detail. Both as supplier and designer he commands five distinct modes of power and control. Every "Man From Logan" has made original contributions to modern automation.

"The Man From Logan" in your area is quickly available. He works with your engineers through design and installation to smooth operation. It is important to consult him early. Write or phone today for a conference on the *dynamation* of your plant.



Logan Conveyors

LOGAN CO., 535 CABEL ST., LOUISVILLE 6, KY.



Howard King, Compressor Supervisor (right) reports to Delmer Sullins, Plant Engineer, National Tank Company . . .

"This new air compressor taught us what 'attention-free' really means"

The Cooper-Bessemer DMR-2 Compressor shown was installed 7 months ago at National Tank Company, Tulsa. It has operated on a continuous schedule since then, delivering 757 cfm air at 125 psig pressure. According to Mr. Sullins, "This is really a reliable attention-free compressor. I like its automatic features and smooth performance."

When you plan compressed air facilities, it will pay you to investigate the new DMR line. These compact air compressors are completely equipped with integral motor-drive, inter-cooler and En Tronic control. Available for 500 to 2000 cfm. Write for Bulletin 94. Experienced engineers of Cooper-Bessemer will help you plan for optimum efficiency. Call our nearest office.

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ENGINES: GAS - DIESEL - GAS-DIESEL
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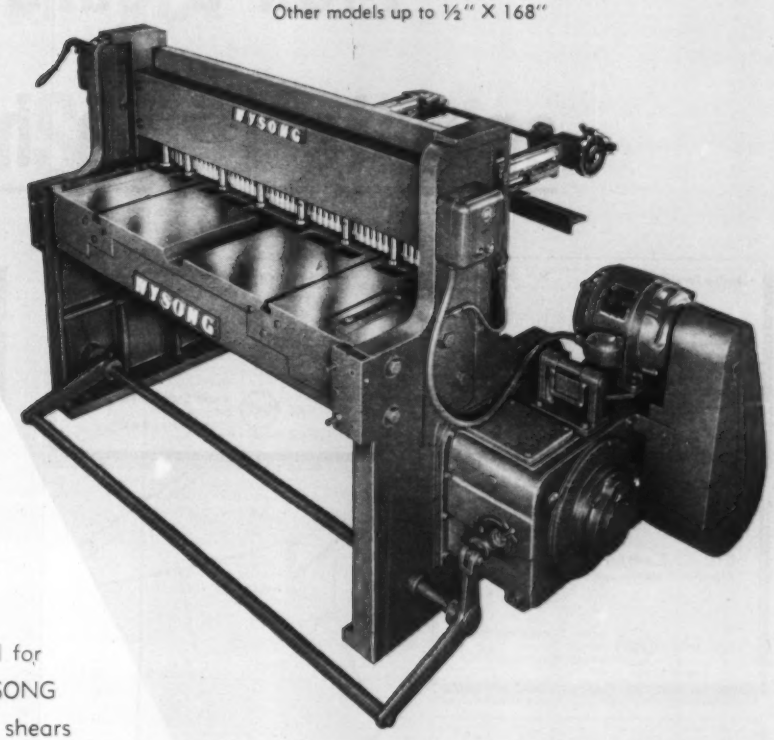
MODEL 1252—Capacity 12 ga. X 52"
Other models up to ½" X 168"



New standards of accuracy are now demanded in more and more shearing operations. Frequently, blanks sheared to yesterday's accepted tolerances are today's costly rejects.

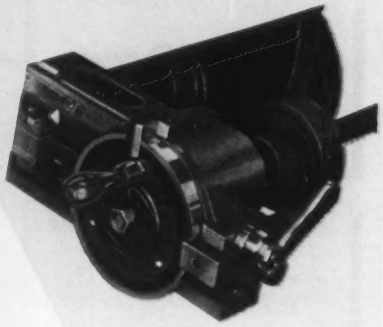
Can you meet today's demand for accuracy? You can with a WYSONG shear. It is the only line of shears equipped with a friction lock back gauge graduated to .001". Precision Ground Acme screws enable you to set the gauge on the exact thousandth that you want.

A new gibbing system, with non-metallic, score proof ways and ½° angular travel, permits closer settings of the gibs and the blades. These important factors contribute to the unsurpassed accuracy that you get with a WYSONG shear.

To meet modern demands, get a truly modern shear.

"Buy a WYSONG - it's MILES ahead"

Saving thousands ... Shaving thousandths!



This gauge is standard equipment on all models normally equipped with rear-operated back gauge. Available at extra cost on models normally equipped with front-operated back gauge.

WYSONG

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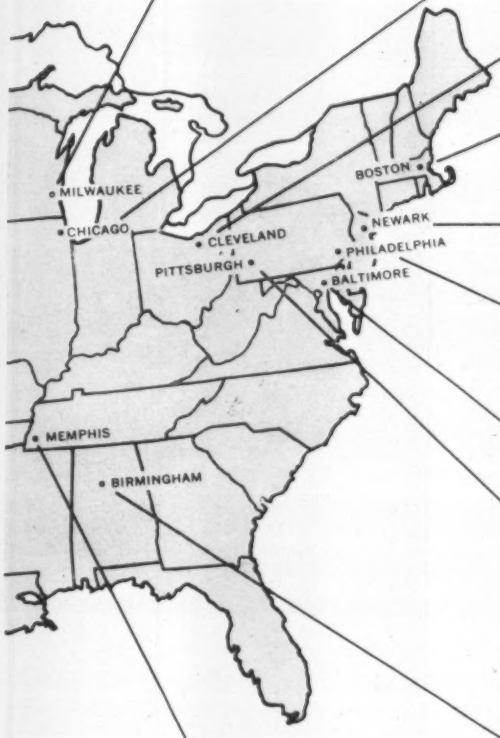

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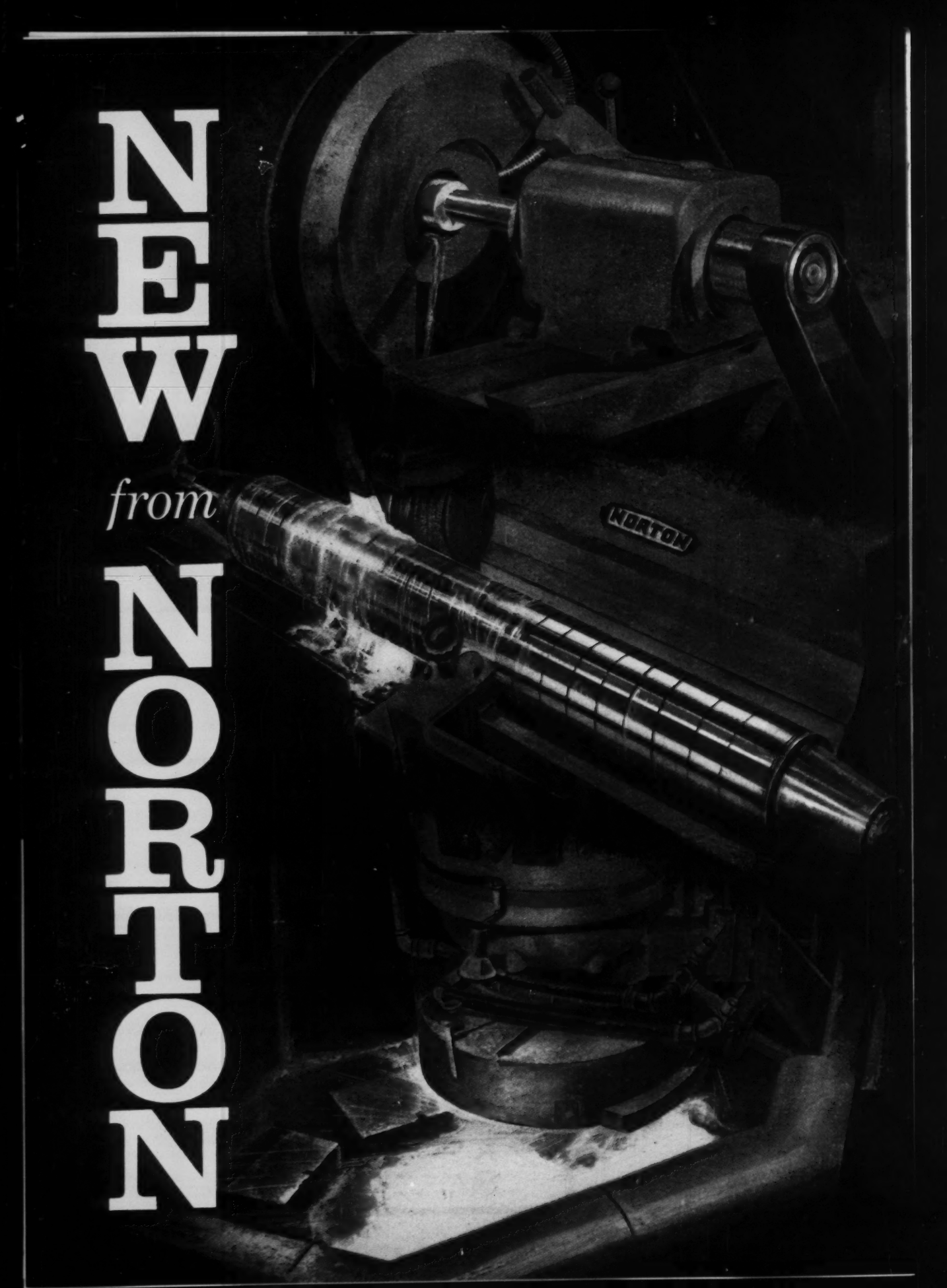
NEW
from
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NORTON

Test
23 ALUNDUM* abrasive
for premium performance at non-premium price . . . on your production!

The newest Norton development for production grinding is for production economy, too.

It's 23 ALUNDUM abrasive.

This is no ordinary aluminum oxide. Except for price — which is *non*-premium — 23 ALUNDUM abrasive is *premium* in every respect. It has premium toughness . . . premium sharpness . . . and free, fast, cool cutting action that means premium precision performance.

Other big advantages are friability, which minimizes dressing . . . precise duplication, which assures uniform performance . . . and versatility that includes grinding of all steels, boiler plate, cast iron, Meehanite, aluminum and many other widely varying metals.

All of which adds up to the proved premium value of 23 ALUNDUM abrasive — in the broadest range of production grinding. For example:

Surface Grinding. With the new 23 ALUNDUM segments and cylinders, users are getting freer cutting and higher production rate on large die blocks, high vanadium steel tool bits, attrition plates, high carbon steel knives, stamped metal parts and similar work.

Centerless Grinding. Excellent results on bar stock grinding for automotive parts of carbon and stainless steels, cast iron and other metals, hard and soft.

Cylindrical Grinding. Top quality, low cost volume production of high speed steel drills, reamers and taps, laminated armatures, cams, shafts, sleeves and valve stems.

Internal Grinding. Bearing races and bores, precision ground faster to tight limits and fine finish, with less wheel dressing. Reduced grinding costs on cylinder bushings, die holes, rocker arms and wrist pins.

That's just a brief outline of 23 ALUNDUM abrasive's advantages for production grinding.

You can *see* them in action, right in your own plant — you can watch 23 ALUNDUM wheels or segments adding new speed, accuracy and economy to your own production grinding.

Your Norton Distributor or your Norton Man will be glad to arrange a test run in your plant, with expert aid in wheel selection. See him soon. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES

W-2007

Making better products . . . to make your products better

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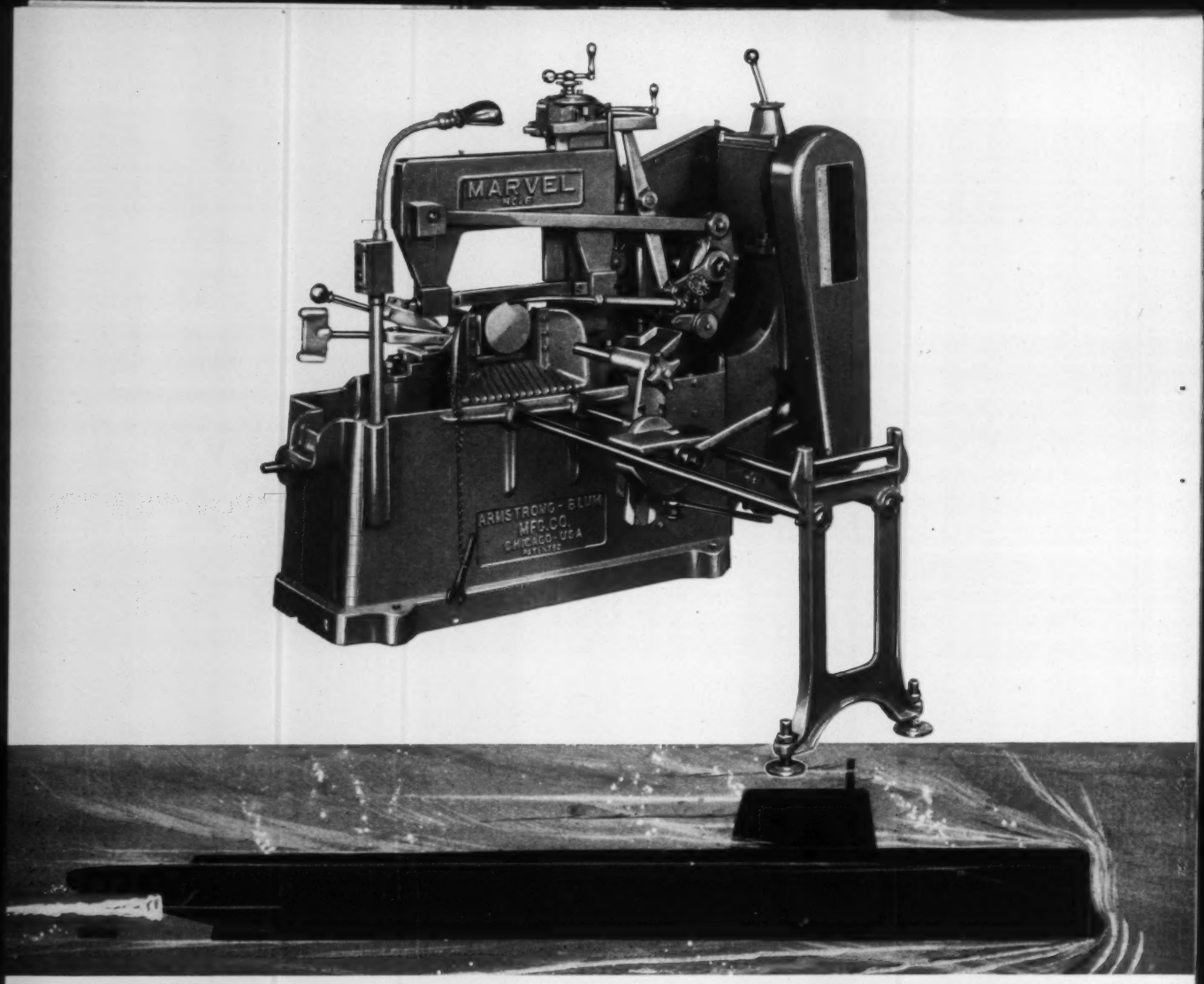


OBSOLETE ?

Emphatically no—not when a Marvel Hack Saw like this one can cut 4600 blanks of 3¼" round 303 stainless steel for just 1½ cents blade cost per cut—not when these 4600 blanks were cut-off at the rate of 20 pieces per hour, floor to floor! And this is typical production performance at that.

Obsolete? This Marvel Hack Saw Machine is as modern in performance as the next atomic powered submarine that will slide down the ways!

If you want faster cutting, the Marvel Hack Saw has speed to spare; accuracy of cut is assured by the rugged construction of the machine itself; blade cost, in many cases is less than 1¢ per cut.

When you consider these advantages and their low initial cost, Marvel No. 6 and No. 9 Series High Speed Heavy Duty Ball Bearing Hack Saws, as we build them, are your best cutting-off equipment buy today.

We can prove our point by demonstrating Marvel Sawing efficiency on your own work, without any obligation on your part. Because we have consistently built both Hack Saws and Band Saws for more than 40 years, we will give you an unbiased recommendation.

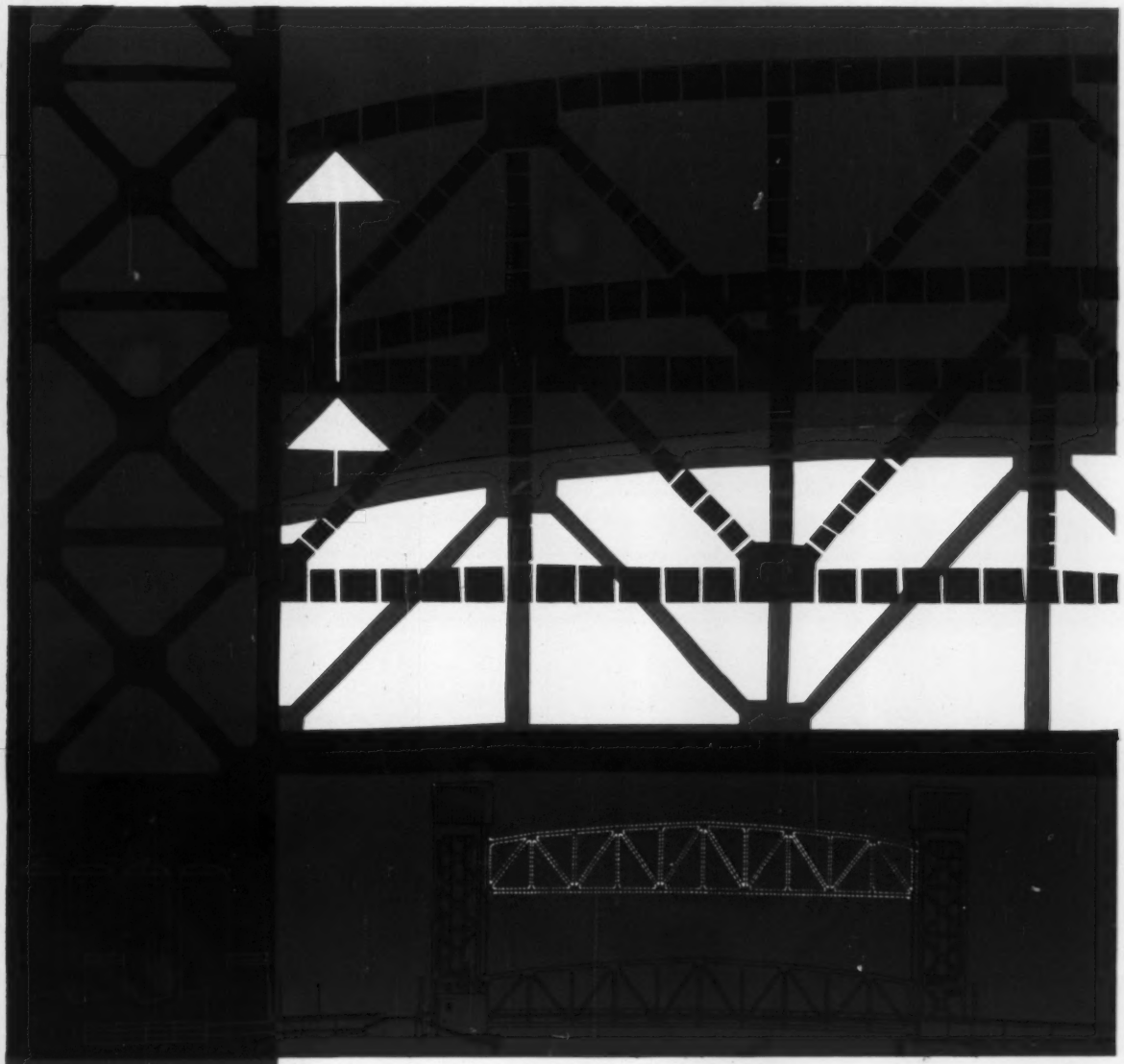
Catalog C-60 illustrates and describes the complete line of Marvel Sawing Machines. Write for your copy.

MARVEL *Metal Cutting* **SAWS**

BETTER MACHINES
BETTER BLADES

ARMSTRONG-BLUM MANUFACTURING CO. • 5700 Bloomingdale Avenue • Chicago 39, Illinois

S-1317



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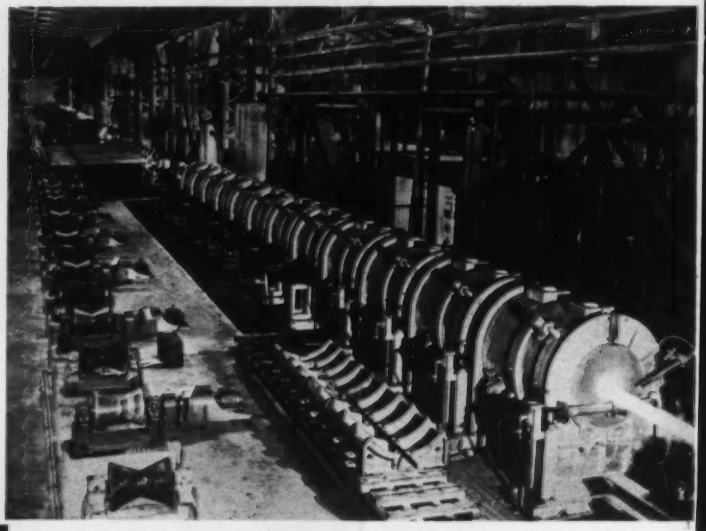
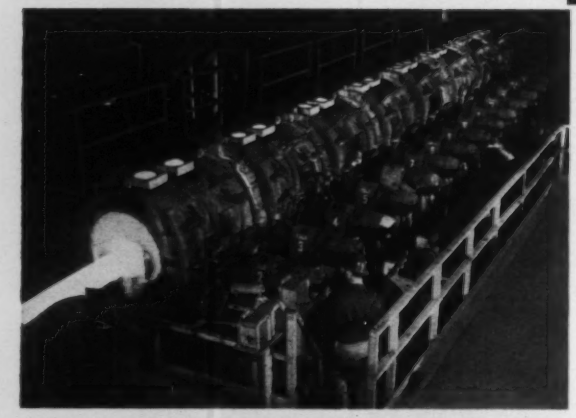
NEW SLANTS ON HEAT PROCESSING FROM SELAS

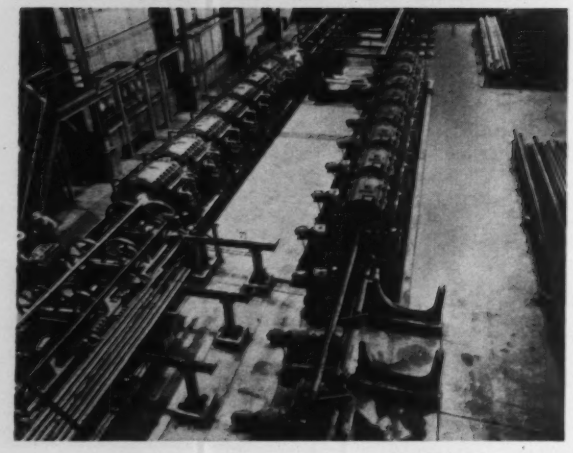
Here's how the Steel Industry relies



TUBING... *is normalized and, if required, stretch-reduced in this Selas barrel-furnace line. After forming and welding, the tubing is conveyed through a 48-barrel normalizing line with exit temperature approximately 1650° F. Stretch-mill product proceeds through 12 additional* GRADIATION® *furnaces which heat tubing to 1800°-1850° F. Entire process is automated, with line speeds matching mill speeds.*



BLOOM REHEATING *"on the fly," at rates of 198 tons per hour is accomplished in this continuous Selas barrel-furnace line. Reheating time of* only 3 minutes *reduces scale, amounting to a saving of 3 tons of steel per hour. Automated handling saved enough to pay for equipment in first 1½ months! Occupying floor area only 63' x 11', this continuous furnace assures uniform rolling temperature within each bloom and from piece to piece.*



SHORT-CYCLE HEATING *of seamless tubing for oil-country application is a typical cost-saving operation for Selas barrel-furnace lines. This overall view shows hardening (left) and tempering (right) lines, with automatic transfer between these treatments. Eight barrels per line. Advantages include: uniform properties throughout, little or no scale, reduced floor space requirements, and high degree of controllability.*

on Selas barrel-line furnaces

The installations on these pages graphically demonstrate how the steel industry relies on Selas barrel-furnaces to

- cut operating costs
- increase production rates
- reduce handling and labor requirements
- save valuable floor space
- improve product quality

Specifically designed and custom-built to meet individual production requirements and job specifications, Selas barrel-line furnaces employ time-proven standardized engineering features for long-time operating dependability and minimum initial investment. Acceptance? 446 Selas barrel-furnaces are at work in 49 separate heat treating lines for a variety of continuous applications including annealing stainless bars and tubing, heating billets for piercing, reheating pierced tubes for sizing, hardening and tempering oil country alloy and carbon tubing, etc.

At your convenience . . . without cost or obligation to you . . . a Selas field engineer would welcome the opportunity to survey your needs. For this personal service contact our Steel Mill Division Office, 300 Mt. Lebanon Blvd., Pittsburgh 34, or our Furnace Division, Dresher.

SELAS CORPORATION OF AMERICA

24 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S.A., Pregny, Geneva, Switzerland. INTERNATIONAL AFFILIATES: FRANCE—Societe Exploitation de Produits Industriels, Paris; JAPAN—International Machine Co., Ltd., Tokyo. BENELUX, PORTUGAL, SPAIN—Union Chimique, Brussels.

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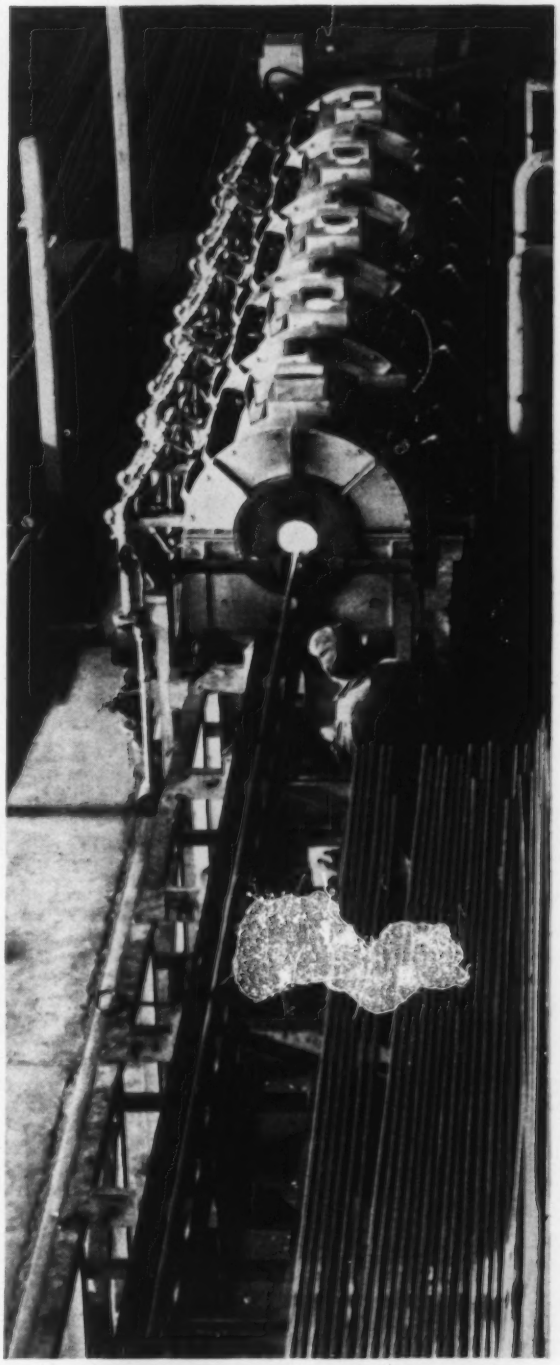
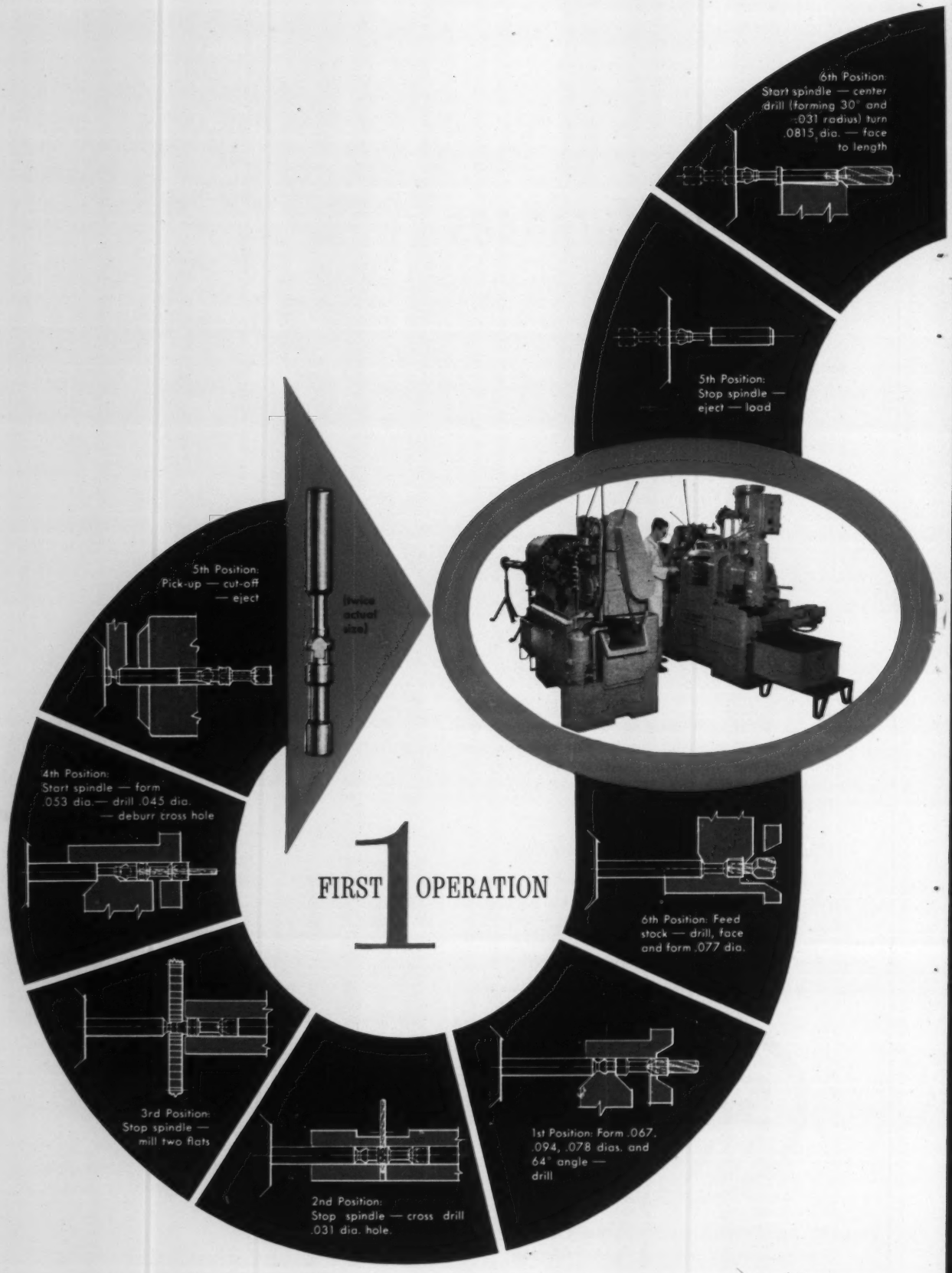
SELAS

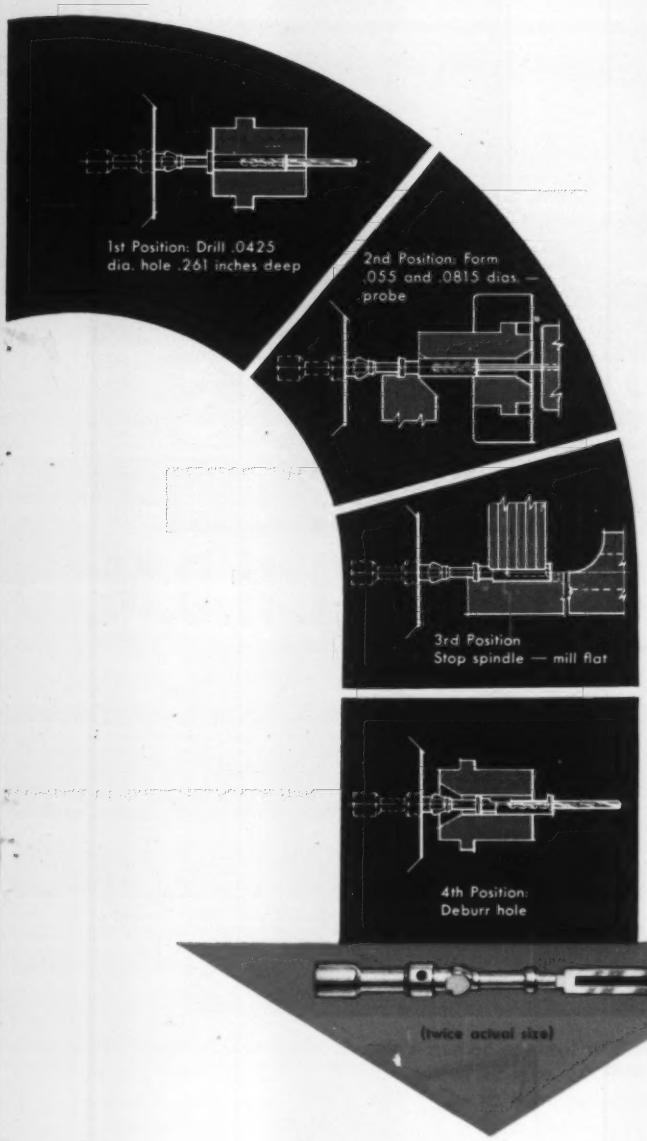
HEAT AND FLUID PROCESSING ENGINEERS

DEVELOPMENT / DESIGN / CONSTRUCTION



STAINLESS STEEL *bars up to 5¼" cross-section and lengths to 30' are continuously annealed, and other grades normalized in this compact line of barrel-type furnaces.* DURADIANT® *burners heat uniformly at high thermal gradient without flame impingement on the work, resulting in minimum oxide formation. Annular ring water-spray quench cools work quickly and uniformly for maximum straightness in the annealed product.*


6th Position:
Start spindle — center drill (forming 30° and .031 radius) turn .0815 dia. — face to length
5th Position:
Stop spindle — eject — load
(twice actual size)
5th Position:
Pick-up — cut-off — eject
4th Position:
Start spindle — form .053 dia.— drill .045 dia. — deburr cross hole
3rd Position:
Stop spindle — mill two flats
2nd Position:
Stop spindle — cross drill .031 dia. hole.
1st Position: Form .067, .094, .078 dias. and 64° angle — drill
6th Position: Feed stock — drill, face and form .077 dia.
FIRST 1 OPERATION


1st Position: Drill .0425 dia. hole .261 inches deep
2nd Position: Form .055 and .0815 dias. — probe
3rd Position
Stop spindle — mill flat
4th Position:
Deburr hole
(twice actual size)

ACME-GRIDLEYS REDUCE MACHINE TIME 80% OPERATOR TIME 70%

...FOR SCINTILLA DIVISION OF THE BENDIX CORPORATION

When it comes to economically turning out large quantities of identical precision parts, most cost-conscious manufacturers rely on Acme-Gridleys. A good example is one of the nation's leading suppliers of electrical connectors to space age industries, Scintilla Division of The Bendix Corporation, Sidney, New York.

Recently, Scintilla converted production of an electrical contact socket and connector to 7/16" RA-6 Spindle Acme-Gridleys. Working to tolerances of .002 on turned diameters, .005 on concentricities and 50 microinches or better on drilled holes, the Acme-Gridleys reduced per-piece machine time 80% and operator time 70%! There was also a significant reduction in the reject rate.

Savings like this are the big reason Scintilla has close to *seventy* Acme-Gridleys in their modern production setup. In your plant, Acme-Gridleys will pay off in similar cost reductions . . . for years to come.

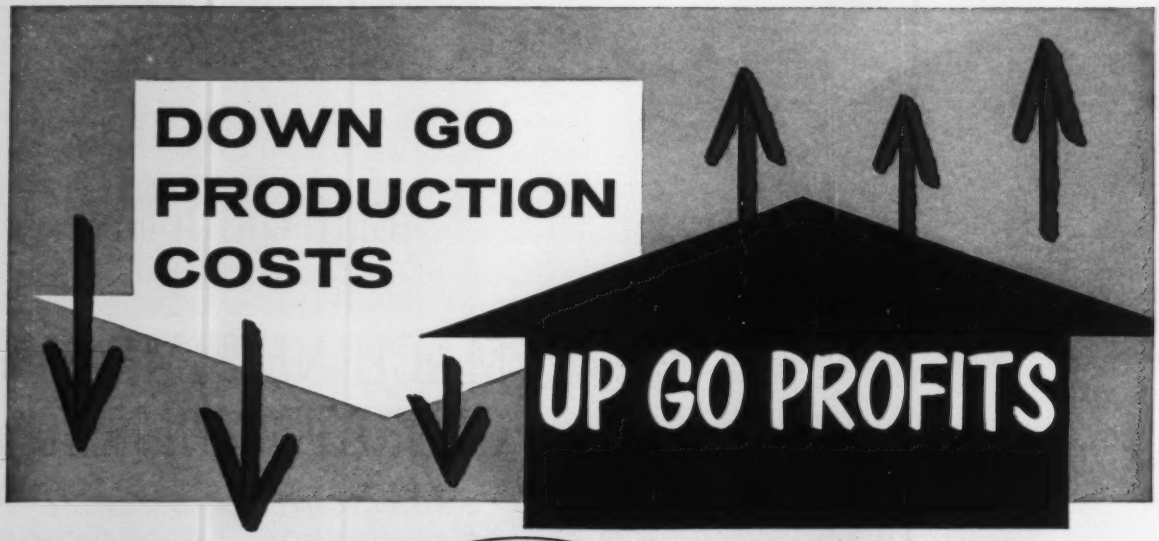
SECOND 2 OPERATION

The number of different jobs that can be set up on Acme-Gridleys amazes everyone. To give you some idea, we've described some 57 actual jobs in a new 64-page bulletin called "Circumferential Automation at Work". At your request, we'll be happy to send you a copy. Call, write or wire.

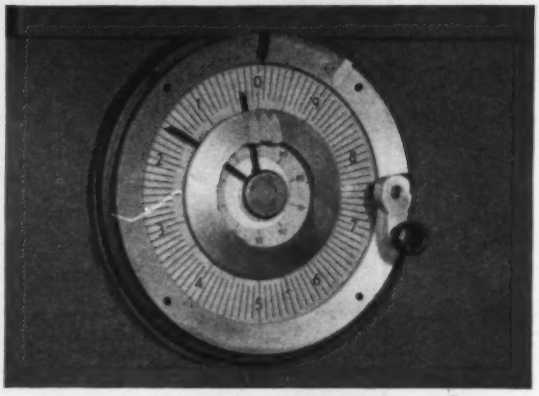
National Acme

The National Acme Company
189 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

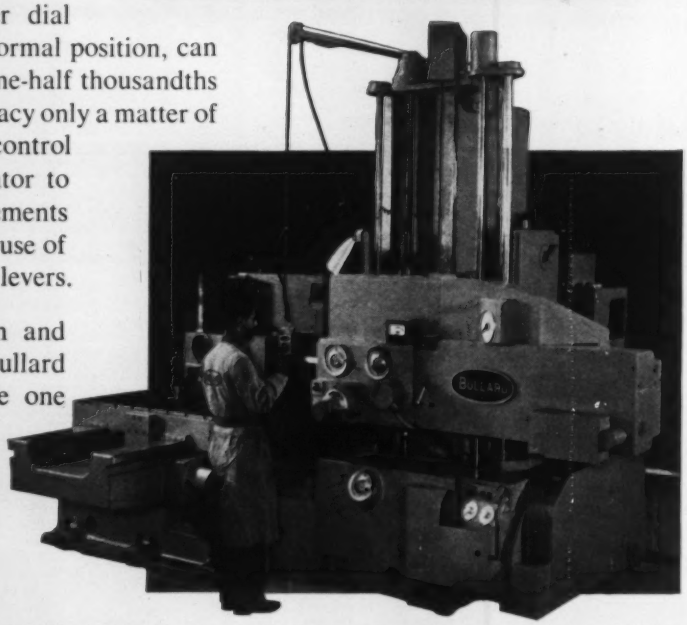


With the NEW BULLARD DYNAMILL H.B.M.



The controls, which have made it possible for Dynamill to reduce non-productive positioning time to a minimum, feature variable traverse rates recorded on large, clock-type dials, and controlled by Bullard's remote control pendant.

Head, table, saddle, and spindle each have a separate three-pointer dial which the operator, from his normal position, can easily read to an accuracy of one-half thousandths of an inch with further accuracy only a matter of simple interpolation. The remote control pendant allows the operator to traverse and position all elements under power without the use of handwheels, cranks or levers.



These and many other design and construction features of the Bullard Dynamill H.B.M. make it the one machine you

must investigate before buying any horizontal boring machine.

THE BULLARD COMPANY BRIDGEPORT 9, CONN.

You get more value for the same dollar— in the NEW Bulletin 709 line of starters!

SIZE 00

SIZE 5

This new line of Allen-Bradley motor control will change every idea you have had about starter size, performance, and life. The small size—especially in the higher ratings—is startling. Yet rating for rating the operating life and reliability have been increased many times. Built into each of the seven sizes of this new Allen-Bradley line is an ability to interrupt tremendous currents and to operate year in and year out for many millions of operations without trouble or maintenance.

The new Bulletin 709 starters are just as advanced in appearance as they are in performance. All seven sizes have an aristocratic styling and a distinctive family likeness. Brooks Stevens, famous industrial designer, has given the enclosures such an attractive, modern style that these new starters will prove a distinct sales asset on any machine or installation.

Why not write today for more information on this revolutionary new line of Allen-Bradley Bulletin 709 *quality* across-the-line motor starters?

Note the compactness of both the smallest and largest starter in the new Bulletin 709 line. Ratings up to 100 hp, 220 v; 200 hp, 440-550 v.

10-62-6M

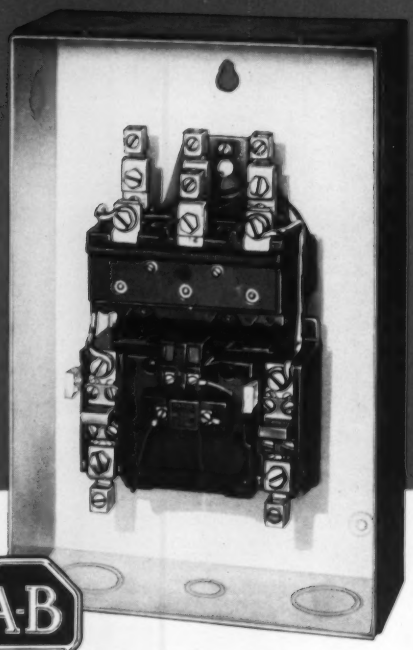
ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

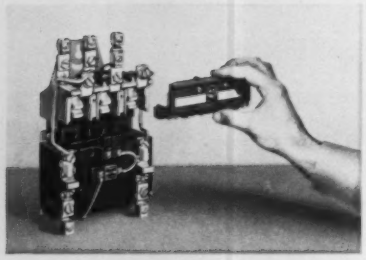
QUALITY MOTOR CONTROL

Features of the NEW Allen-Bradley starter line that are of value to you!

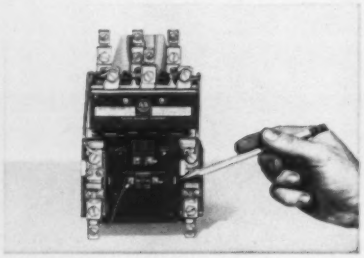


New Bulletin 709 Size 3 across-the-line motor starter. Note the generous space for wiring, accessible terminals, and white interior.

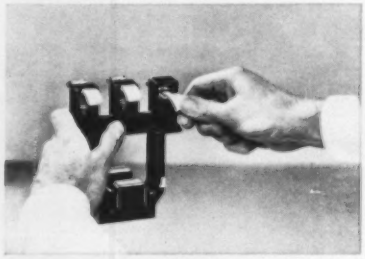
Every detail of the new Allen-Bradley motor starters has been designed to help make this the best line of motor control on the market. Remarkably small in size, each starter is a giant in performance. Being light in weight, these starters are easy to handle and a cinch to install. The generous wiring space, full front wiring, white interiors, and convenient knockouts make installation easy. The enclosure cover is firmly held with a quarter-turn fastener. All installation, inspection, and maintenance operations can be handled from the front—as shown in the illustrations below—without the use of special tools.



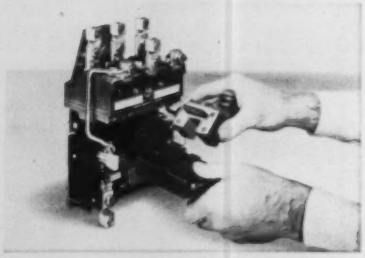
QUICK, EASY CONTACT INSPECTION—When the arc hood front cover is removed by loosening two captive screws, contacts are plainly visible from the front.



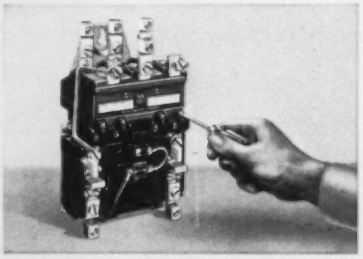
CONTACT POSITION INDICATED—Two slots in the coil cover show the position of the movable contact support—tell whether contacts are "closed" or "open."



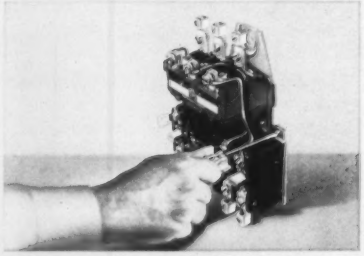
CONTACTS EASILY REPLACED—Depress the spring slightly, and the movable contacts can be lifted out of the molded support and the new contacts slipped in.



COIL EASILY CHANGED—When the coil cover is removed, coil and magnet yoke can be lifted out from the front. They are impossible to replace incorrectly.



AUXILIARY CONTACTS EASILY ADDED to the front of the starter. Two extra auxiliaries can be added to Sizes 0, 1, and 2 starters, and four, to Sizes 3, 4, and 5.



A THIRD OVERLOAD RELAY CAN BE EASILY ADDED in the field, from the front of the starter. And the only tool needed is a common screwdriver.

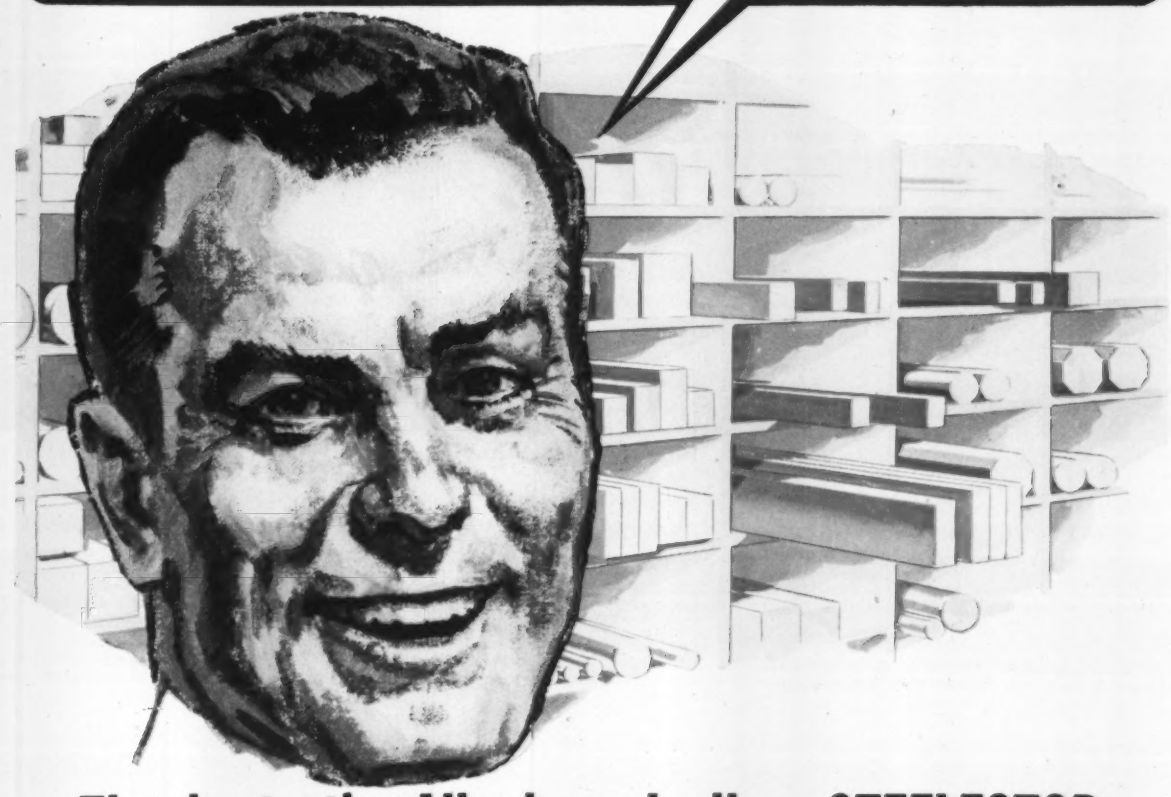
ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

QUALITY MOTOR CONTROL

"I Know Every Tool Steel Grade and Size in Warehouse Stock"



Thanks to the Allegheny Ludlum STEELECTOR

"We simplified tool steel selection immensely when we started using the A-L STEELECTOR System. It slashed our selection time to seconds. And our local warehouse always has the grade and size we need in stock—ready for immediate delivery.

"Here's how we use the STEELECTOR System: We check bar graphs of the STEELECTOR Card for the job at hand (there are cards for hot work, high speed, and tool room grades) to compare the abrasion resistance, toughness, size stability, machinability, and red hardness of the STEELECTOR grades. In seconds we can pick the best combination of properties.

"We confirm our selection with the STEELECTOR Data Stock List. (There is a List for each STEELECTOR grade.) The Data Stock List itemizes every size and shape in stock. It tells us before we order that the particular grade and size we need is ready for immediate delivery. The STEELECTOR System and quick warehouse delivery have enabled us to reduce our own inventory.

"The Data Stock Lists also tell us proper hardening, tempering, and annealing temperatures. The steel analysis and AISI number are listed along with a description of the steel's properties. And a list of suggested working hardnesses for typical applications serves as a check on our use of the grade."

The STEELECTOR System is remarkably easy to use. If you haven't investigated it yet, ask your A-L representative for your copy of the colorful, 10-page STEELECTOR Booklet, or write: ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania.*** Address Dept. S-4.

3241

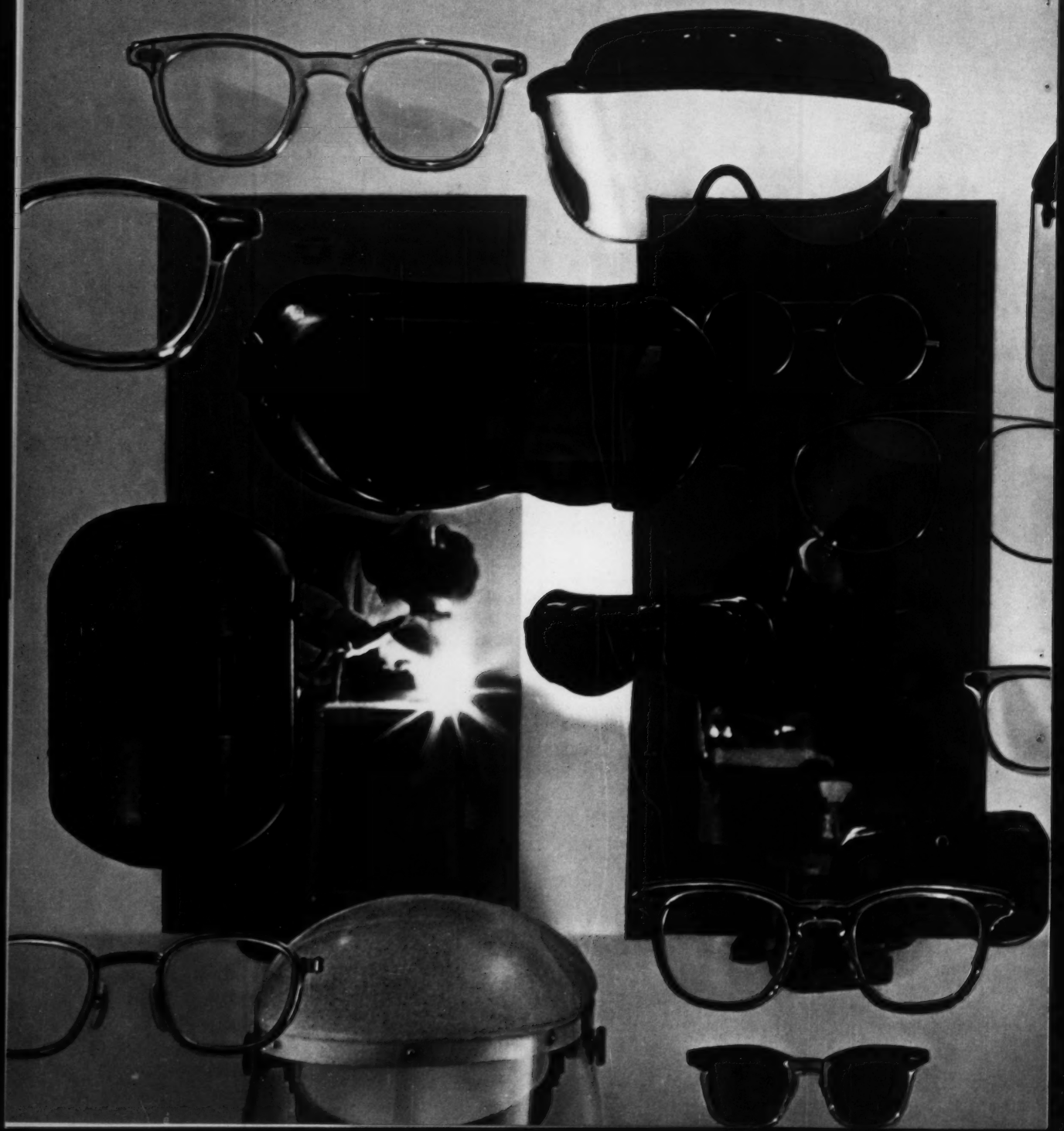
STEELECTOR PROGRAM

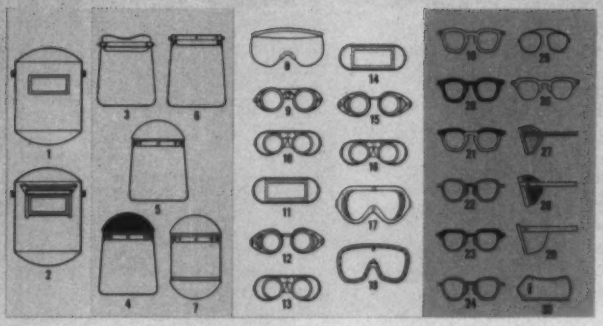
ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

THE LOGIC OF PLACING YOUR SAFETY EYEWEAR BUSINESS WITH THE MAN FROM MSA: enough styles, enough optional features to satisfy the whim of any wearer. *We'd like to help you win your worker's full-time acceptance of eye and face protection. It shows through in the sheer weight of numbers we offer the wearer to choose from. You see it again in the smart, trim lines of the styling. It's visible too in our ability to match the right equipment to the right job. Add to this big picture approach a complete vision program, including Rx service. And there you have it. A truly complete package. That's why it's so logical to place your safety eyewear business with the Man from MSA.*

MINE SAFETY APPLIANCES COMPANY, Pittsburgh 8, Pennsylvania MSA





M-S-A Welding Helmets

1. Full Curve Fixed Front
2. Full Curve Lift Front

M-S-A Faceshields

3. Minigard
4. Super-Gard
5. Facegard with Sparkgard
6. Facegard without Sparkgard
7. Nitrometer Mask

M-S-A Goggles

8. Jones Visor Goggles
9. Metal Frame Flash Goggles
10. Comfo Chippers' Goggles
11. Clearvue Chippers' Goggles
12. Chippers' Cup Goggles
13. Chippers' Cover Goggles
14. Clearvue Welders' Goggles
15. Welders' Cup Goggles
16. Welders' Cover Goggles
17. Rubber Frame Goggles
18. Soft Sides Goggles

M-S-A Sightgard Spectacles

19. Flesh Acetate
20. Ebony Acetate
21. Ebony-On-Crystal Acetate
22. Metal
23. Acetate-On-Metal
24. Smoke with Aluminum Temples
25. Metal "Clip-Ons"
26. Visitors' Spectacles

With Side Shields

27. Perforated Acetate Side Shield
28. Wire Mesh With Acetate Edge Side Shield
29. Solid Acetate Temple-Mounted Half Shield

M-S-A Open End Case With Pocket Clip

30. (Wide range of MSA cases available)

B-L-H Loewy expanding and pipe testing equipment . . . high production, fully automatic, flexible

Combining two separate operations—full length expanding and hydrostatic testing—in one unit, B-L-H Loewy equipment assures pipe that is free of welding defects, true to dimensions, and of expanded physical properties.

Fully automatic, B-L-H machinery maintains high production rates. Large filling valves and specially designed purge valves assure rapid and trouble-free operation. Flexibility is another important feature. Special design permits quick change of the expander from one pipe diameter to another.

And pipes varying in length from 15 to 55 ft. can be processed within the same production run.

The B-L-H line of testers is specifically designed to meet the maximum pressures of the API standards. Testers for extreme pressures are completely enclosed in a heavy safety shroud with automatically operated doors to protect the operator and other personnel. For further details about our expanders and pipe testers or for information about our automatic pipe inspection and data processing equipment, write us at Dept. B-4.

Artist's rendering of typical B-L-H Loewy pipe mill

BALDWIN · LIMA · HAMILTON

Industrial Equipment Division • Philadelphia 42, Pa.

COLD ROLLED STRIP STEEL

made for YOU

by THOMPSON

There is a difference in Thompson Steel... it's made to your specifications. From the moment your order is received, it is individually processed to have the accuracy, the hardness, the finish—all the physical and chemical properties you must have to make your part on your tools economically and efficiently.

Thompson can make the steel that guarantees you product satisfaction. We have the very latest in strip mill equipment; workmen who have spent their lifetimes accumulating steel "know-how;" standards of quality that have never been compromised.

There is a difference in Thompson Service. Phone today. You'll be connected to a man who not only will get your order started properly and without delay, but who like all of us at Thompson's has a sincere desire to be helpful. Your order will be shipped direct from our mill, saving you time and money.

THOMPSON
WIRE COMPANY
THE QUICK SERVICE MILL

Mills Strategically Located to Serve You

THOMPSON WIRE COMPANY

9470 King St. Franklin Park, Ill. NAtional 5-7474	27840 Groesbeck Hwy. Roseville, Michigan PRescott 5-6804	41 Mildred Ave. Boston 26, Mass. CYpress 8-6550	115 Stafford St. Worcester, Mass. PLeasant 6-4643	North Point Road Baltimore, Md. ATwater 4-8500

How the Foundry Industry Serves America . . . #14 of a Series

SHOULD A MATERIAL BE LIGHT OR RIGHT?

The properties of cast iron make it practically ideal for a great many uses. Why "practically" ideal? Because the industry has heard a lot of promotion and commotion about just one thing lately—and that's *weight*. But the importance of saving weight is relative; the ability to do the job comes first. Otherwise cars, and coins, could be made of wood or feathers or cork.

For example, why take a part made of a hard, dense material like cast iron—with its high tensile strength and ability to stand up to extremes of heat, vibration and friction without getting tired—and substitute another, more expensive material (with fewer of these characteristics) *simply because it is not as heavy?* Replacing the right material with a lighter one could affect production costs so that the pounds saved would be the most expensive pounds of all!

Since customers today are demanding *more* dependability and many manufacturers have *lengthened* warranty periods, is this the time to trade long life for high-priced lightness?

Leading engineers and designers, along with their colleagues in the iron foundry industry, believe that this is the time to use materials with the natural characteristics best suited to the job, and make *them* as light as possible through design and engineering. Together, they have already developed iron castings that reduce vehicle weight—economically.

HANNA
BEHIND EVERY HANNA FURNACE IS HANNA IRON

THE HANNA FURNACE CORPORATION
Suppliers of quality pig iron to the American foundry industry
Boston • Buffalo • Chicago • Detroit • New York • Philadelphia
Hanna Furnace is a division of
NATIONAL STEEL CORPORATION

New Century Electric motor provides low-cost power for fans, blowers, pumps and compressors.

New Century Electric part-winding motor gives extra smooth start

This new motor . . . at either 1200 or 1800 rpm's . . . will give smooth, cushion acceleration. No cogging, jerking or jarring equipment. Just dependable starting power with the same reduction in starting current of all Century Electric part-winding motors. A special winding scheme makes this extra smooth start possible.

Applications—Have an application where power company restrictions limit inrush current? The complete line of Century Electric part-winding start motors may be the answer. They provide the most economical and dependable way of starting equipment such as fans, blowers, centrifugal pumps and compressors, as well as reciprocating compressors with unloading valves.

Reliable power—High quality construction features include . . . coils insulated with tough polyvinyl acetal resin . . . windings dipped and baked with several coats of high temperature synthetic varnish which protect against oil fumes, mild acids, dust and grit . . . rotors dynamically balanced so motors run smoothly and quietly . . . rugged cast iron frame for long life and low noise level. Century part-winding start motors are available in 20 to 150 hp sizes and in speeds of 1200 and 1800 rpm.

Application aid—A Century Electric application engineer will be glad to discuss your part-winding start problems with you. Century Electric also makes a complete line of motors . . . all sizes and types from 1/20 to 400 hp. For a copy of the new Century Electric Motor Application Guide, please write for bulletin 270A. For *more* than a motor . . .

CENTURY ELECTRIC COMPANY

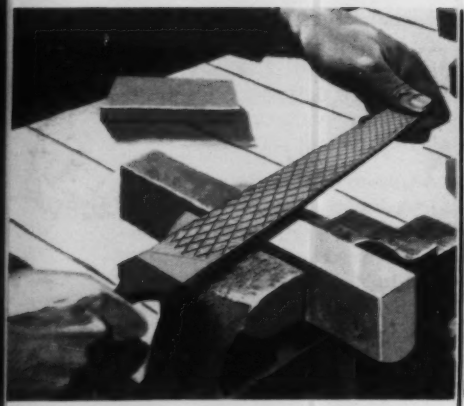
St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

59-13

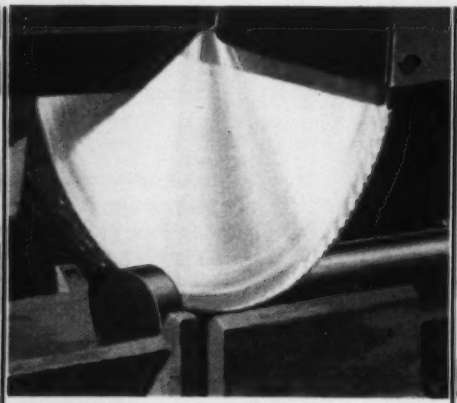
SIMONDS MEANS SAVINGS WHATEVER YOU CUT

Now Change from



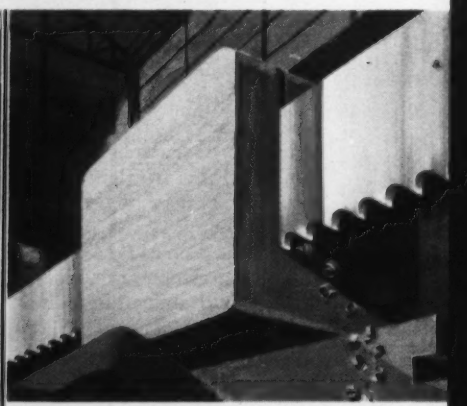
"Red Tang" Files

For faster, easier filing, Simonds "Red Tang" Files are sharper to start with, hog off more metal per stroke. More wear-resistant, too, they keep on cutting long after other files have turned dull and useless.



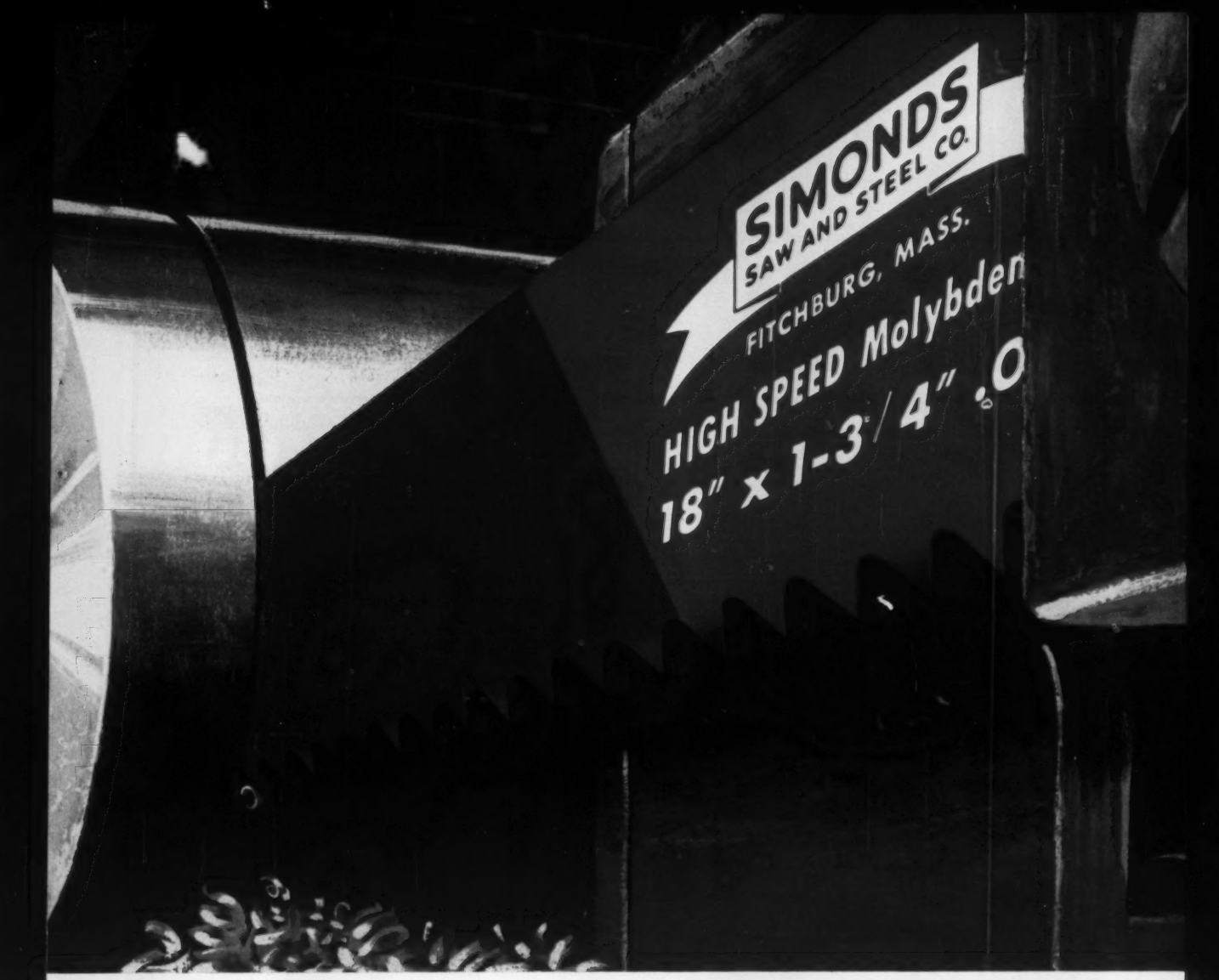
Simonds Circular Saws

Tops for fast, straight cutting, Simonds Saws are designed and made to stay on the job longer. Available in 5 types: Solid Tooth, Hard Rim, Inserted Tooth, Segmental and Carbide Tipped — for lowest cost cutting of all kinds of metal.



Simonds Band Saw Blades

Our new "Super" High Speed Steel Band will give you up to 3 times better performance than any other high speed steel blade you're now using. It's a startling new advance that can substantially reduce your cutting costs.



Hacking to Cutting...

with Simonds "Red End" Hacksaw Blades

Important Cutting Fact! Simonds big "Red End" Hacksaw Blades cut curled *chips* like the cutting tool on a lathe.

Result? You cut faster, you cut straighter — get more work done in far less time.

What's more, Simonds blades are made from tough, cross-rolled steel . . . steel that *stays sharp* longer, resists *breakage*, gives you *many more cuts* per blade!

But don't take our word for it. Test a box of 10 Simonds "Red End" Blades against any 10 others. See for yourself how Simonds will up your cutoff production, lower your blade costs.

Simonds "Red End" Power Blades come in All-Hard and Shatterproof types in all standard lengths, thicknesses and tooth spacing . . . a "right" blade for every job.

Three types of Hand Blades are also furnished in all standard specifications for easier cutting, longer life and lower costs. Call your local Simonds Distributor for prompt delivery or further details.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASSACHUSETTS

Buy through your local Simonds Distributor for — Local Stocks – Local Speed – Local Skill

Factory Branches in Union, N. J., Chicago, Shreveport, La., Los Angeles, San Francisco, Portland, Ore. • Canadian Factory in Granby, Que. • Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.; Heller Tool Co., Newcomerstown, Ohio; Simonds Abrasive Co., Philadelphia, Pa. and Arvida, Que., Can.

IF COMPETITORS MATCH YOU IN PRICE AND QUALITY...

the *LOCTITE* method can give you a double edge

The LOCTITE Method is a bold new approach in metalworking assembly. It reduces rejects, machining time, assembly failure, customer complaints . . . saves on parts and inventory.

Here's what it does: LOCTITE Sealant improves the reliability of press fits and increases their strength—replaces all sizes of lock nuts, screws and washers, jam nuts and interference threads—secures screws and locks studs—seals joints against high-pressure fluids—holds gears, rotors, armatures and fans to shafts.

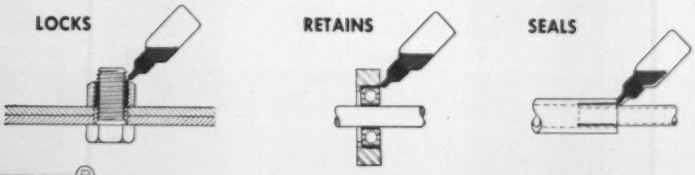
And it does this without a penny invested in equipment. LOCTITE Sealant is simple to use. It can be applied to assembled parts or applied to parts prior to assembly. The plastic container is the applicator. Where desirable, automatic or mass application procedures can easily be set up with "around-the-shop" parts and materials.

What is LOCTITE: LOCTITE Sealant is a penetrating liquid resin that hardens when confined between closely fitted metal parts. It "wicks in" between the most closely mated of matched precision surfaces and hardens into a strong, heat-, oil-, grease-, solvent- and vibration-resistant bond. There are no solvents to evaporate—no catalyst to mix.

Want to reduce costs of your production assemblies? Press fits depend on costly precise tolerances . . . the LOCTITE Method does not. LOCTITE makes a slip fit as strong as a press fit and a press fit still stronger. Thus it can be used to relax tolerances and to improve reliability. Here's one example: An anti-friction bearing with a press fit required 6,000 lbs. to remove it from its housing, while with a slip-fit and the application of a few drops of LOCTITE *it took 8,000 lbs. to remove the same bearing!*

Wherever metals are LOCKED—RETAINED—SEALED in your production assemblies, there is an opportunity to cut costs and realize better profits with the LOCTITE Sealant Method. Details on your application bring immediate response from our Application Engineering Dept. Write today.

LOCTITE GIVES YOU A DOUBLE EDGE—PRODUCTION ASSEMBLY SAVINGS AND GREATER RELIABILITY.



LOCTITE® SEALANT

American Sealants Company • 257 North Mountain Road
Hartford 11, Connecticut

hoover quality

. . . RACEWAYS HONED SMOOTHER THAN PLATE GLASS

It's easier to strike a match on plate glass than on the smooth surface of a Hoover bearing raceway. A special process, developed and used only by Hoover, hones raceways until they are ultra smooth, superbly finished. With both inner and outer raceways *Hoover Honed* to microscopic perfection, Hoover ball bearings have a distinctive quality advantage.

Equally important as the *Hoover Honed* raceways are carefully matched sets of *Micro-Velvet* balls which are accurate within millionths of an inch. These precision components work together in hushed quietness, an excellent indication of bearing quality and a characteristic of all Hoover bearings.

Outstanding quality—*Hoover Quality*—pays off in longer life, greater load capacity and superior bearing performance in a wide range of applications.

Hoover Honed and *Micro-Velvet* are Hoover Trademarks

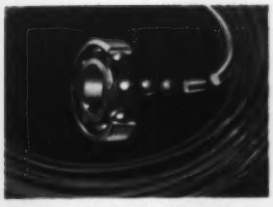
hoover

BALL AND BEARING COMPANY

5400 South State Road, Ann Arbor, Michigan

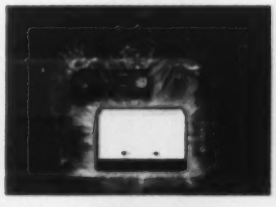
Zone Sales Offices and Warehouses | 8581 South Chicago Ave., Chicago 17, Illinois
290 Lodi Street, Hackensack, New Jersey
2020 South Figueroa, Los Angeles 7, California

hoover CONTROLS *hoover quality* FROM START TO FINISH

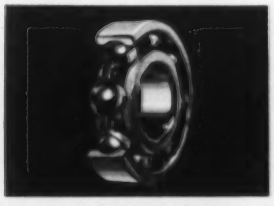


Hoover's Cuyahoga Steel and Wire Division produces quality chrome alloy steel wire from which balls are made.

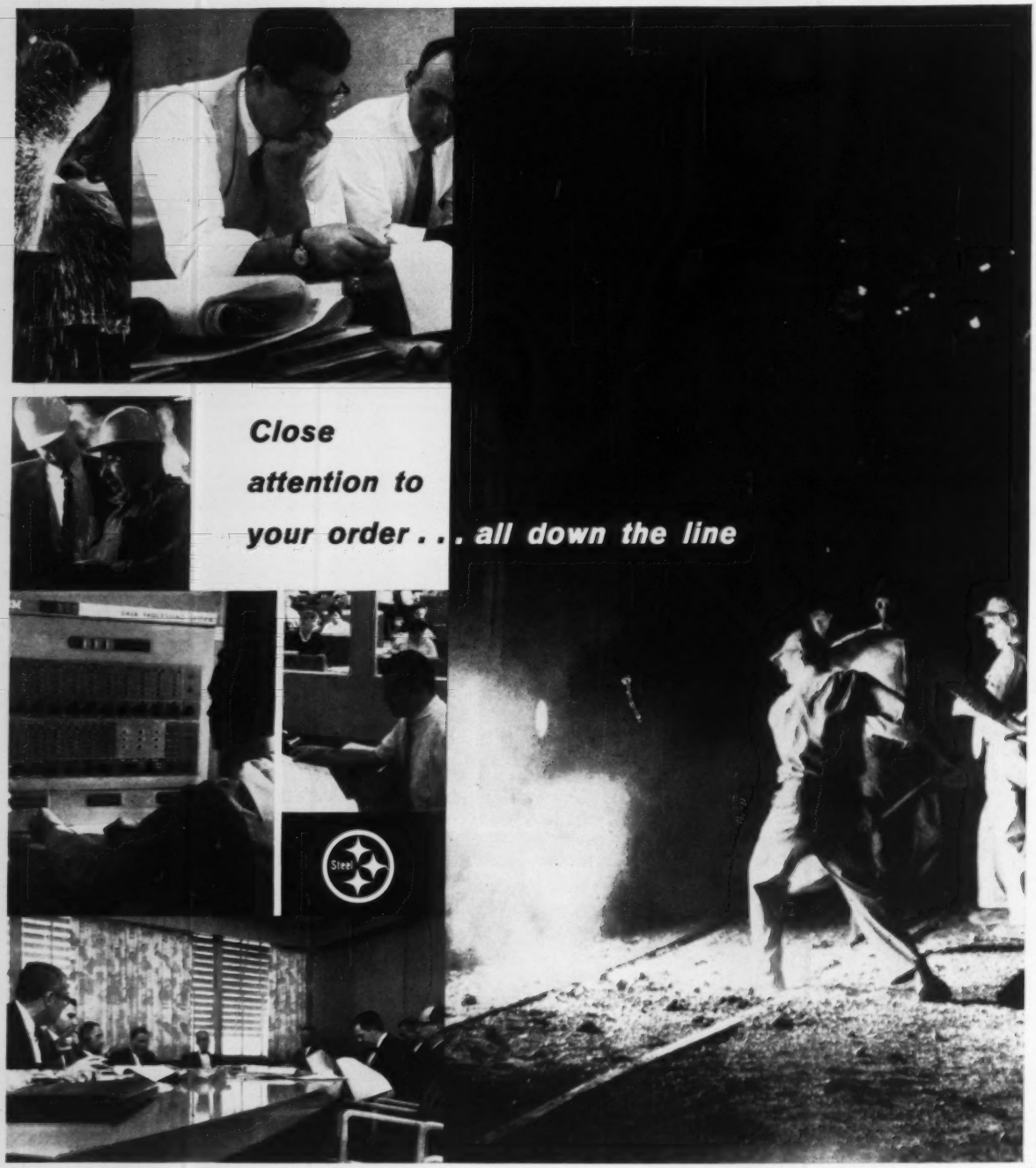
Micro-Velvet balls are products of Hoover Ball Division plants in Middletown, Ohio, and Erwin, Tennessee.



Non-destructive electronic testing devices check bearing parts for tolerance, hardness and hidden flaws.



Hoover bearings in a wide range of types and sizes always measure up to high *Hoover Quality* standards.



Alan Wood is just the right size to give your order and requirements the close attention of Alan Wood's skilled steel-men . . . all down the line. You get the advantage of young creative thinking tempered by 135 years of solid experience. Alan Wood's fully integrated operation cuts red tape, gives you uniform quality in plate, sheet and strip . . . consistently . . . and ON TIME.

***that's your advantage at* ALAN WOOD STEEL COMPANY**

Conshohocken, Pa. • STEEL PRODUCERS WITH THE CUSTOMER IN MIND

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada: A. C. Leslie & Co., Limited

THE LOWER-COST FAN FOR RUGGED SERVICE!

- **for handling heavy dust loadings and abrasive materials.**
- **for induced draft on industrial and power plant service.**
- **choice of three wheels to meet your requirements.**
- **available with inlet vanes or open inlet.**

The 'Buffalo' Type CR Radial Wheel Fan embodies many quality features found only in the finest 'Buffalo' ventilating and draft fans.

Full inlet-to-duct streamlining minimizes abrasive effect and provides stable, efficient performance. The streamlined housing, the curved inlet bell and inlet wheel flange, the smoothly diverging outlet . . . are the same as those in our well-known BLH and airfoil lines. A special tapered inlet box assures smooth entry.

Long-Life CR construction includes heavy-gauge reinforced steel plate housings and inlet boxes with air-tight access doors; heavy-duty self-aligning sleeve or water-cooled bearings; and shafts sized to run well below critical speed and ground to a close fit on the thrust bearing.

A choice of three wheels of varying widths permits exact matching to your pressure-volume requirements with minimum driving horsepower.

For first-cost savings and continued low-cost performance on many severe services, there is no better buy than the 'Buffalo' Type CR Fan. Write for Bulletin FD-205.

"Buffalo"

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Buffalo Pumps Division • Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

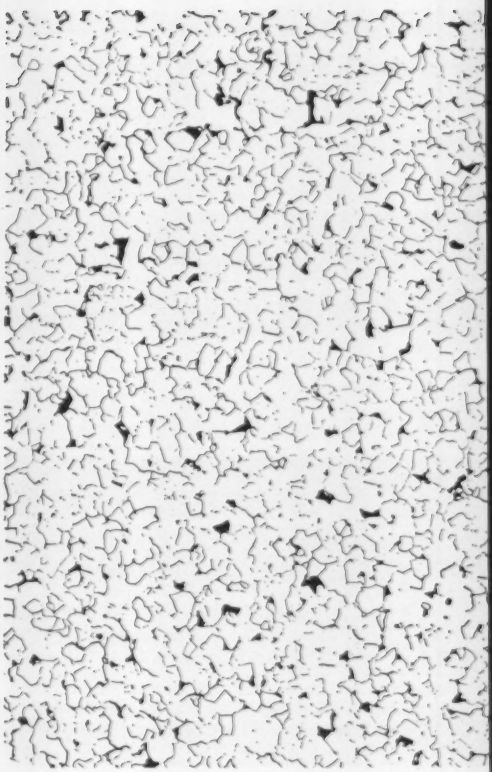
'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

This mark tells you a product is made of modern, dependable Steel.

What you see can't hurt you—At the right is a section of USS National Electric Welded Tubing magnified 100 times with a metallograph to check for weld flaws—and there aren't any here. You can't even see where the tubing ends and the weld begins. Their grain structure is identical. (The weld runs vertically down the center of the picture.) Even microscopic flaws are easy to spot on the acid etched surface. We also check the microstructure, cleanness, and grain size of the weld. Welded tubing must be flawless so we don't depend on visual inspection alone. To be absolutely sure, we test our tubing far beyond specifications. To do this we have designed new and more accurate testing equipment. Some of this test equipment even tells us when it is not working properly. We go to extremes to be sure that USS National Electric-Resistance Welded Tubing will stand up in critical pressure and mechanical applications that demand the utmost in strength, dependability, and uniformity. If you'd like more information, write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

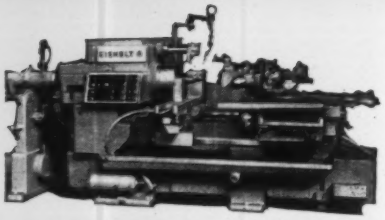
USS and National are registered trademarks



National Tube Division of United States Steel

USS

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Supply Division, Chicago
United States Steel Export Company, New York



GISHOLT MASTERLINE® AR TURRET LATHE

Converts for bar or chucking work in less than one hour. Sets up like a turret lathe, uses same standard tools. Cycle setting learned in a day. Offers automatic drill withdrawal for chip clearing; internal threading with solid taps; external threading with self-opening die heads; reverse feed and individually adjustable dwell; 16 spindle speeds and infinite feeds—none lost when threading.

Ask your Gisholt Representative for a desk-side demonstration, or write for Catalog 1224.

Are you keeping step with new developments in automatic machining? Many of your competitors are —and cutting costs substantially.

Even small runs—both bar and chucking work—are now going automatic.

How? With the new, fast, easy setup designed into the Gisholt AR (Automatic Ram) Turret Lathe.

Change-over time is the same as for a hand-operated machine. And—the automatic cycle cuts machining costs 25% to 40%.

To be competitive you *must* go automatic. Why wait?

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers® • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

BLAW-KNOX

WIDE FLANGE BEAM and STRUCTURAL MILLS

Blaw-Knox designs and builds a full range of Wide Flange Beam and Structural Mills. Other Blaw-Knox equipment for the metals industry includes: Complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals • Sheet and strip processing equipment • Electrolytic tinning, annealing, and galvanizing lines • Seamless pipe and tube mills • Draw benches and cold draw equipment • Blaw-Knox Medart cold finishing equipment • Iron, alloy iron and steel rolls • Carbon and alloy steel castings • Fabricated steel plate or cast-weld design weldments • Steel plant equipment • Heat and corrosion resisting alloy castings. Blaw-Knox Company. Foundry and Mill Machinery Division. Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

Wide Flange Beam and Structural Mill at the South Works of the United States Steel Corporation

Just a little

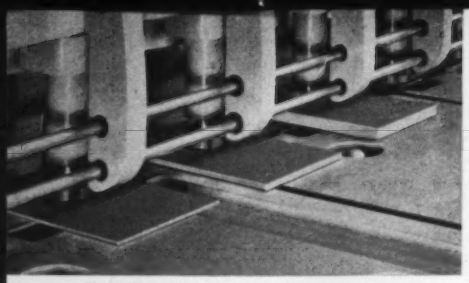
Vancoram Ferrovanadium does such a big job! Vancoram Ferrovanadium does an outstanding job in a surprisingly economical way! In constructional steels, tool and die steels, deep-drawing steels, cast and forged steels, and in cast irons, no other alloying element is so versatile. It readily forms stable carbides and controls grain growth. In cast irons it is unusually effective in restraining graphitization. Vanadium imparts toughness, durability, strength and resistance to wear. Try it and see!

Call or write your nearest VCA District Office or VCA distributor for the whole story. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

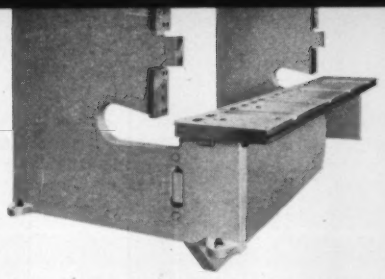
VCA Products are distributed by: PACIFIC METALS COMPANY, LTD.; STEEL SALES CORPORATION; J. M. TULL METAL AND SUPPLY COMPANY, INC.; WHITEHEAD METALS, INC.; WILLIAMS AND COMPANY, INC.

Be sure to visit us at the Hotel St. Francis during the 65th AFS Castings Congress, San Francisco, May 8 to 12.

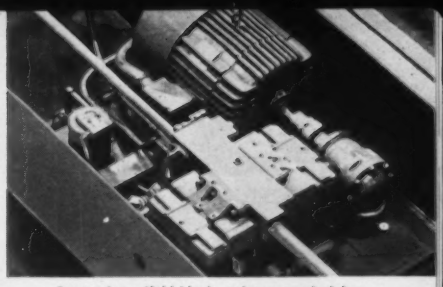
VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals



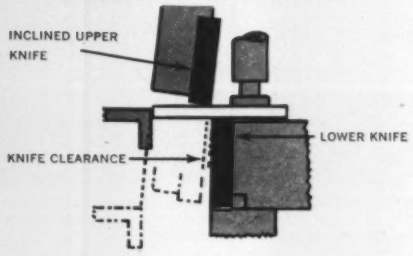
Hydraulic holddowns hold work securely.



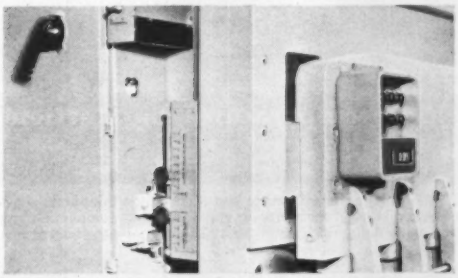
Interlocked construction eliminates load supporting welds.



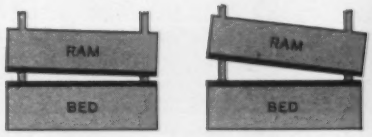
Compact manifold block replaces usual piping.



Inclined ram makes use of four edge knives practical.

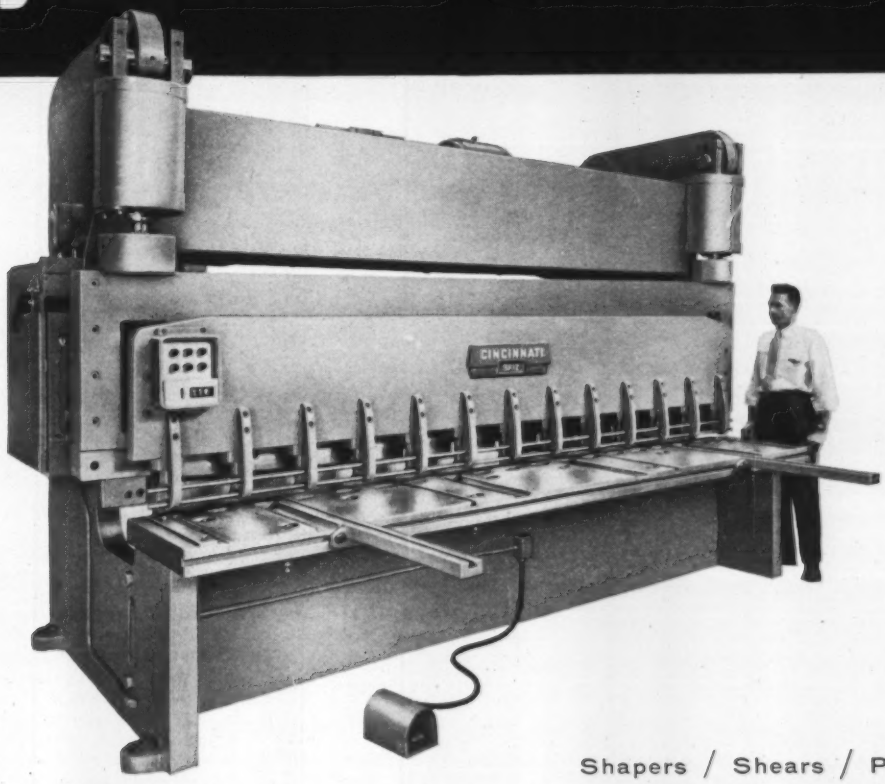


Centralized controls improve operator's productivity.



Adjustable rake gives you extra shearing capacity.

CINCINNATI®
hydraulic shears



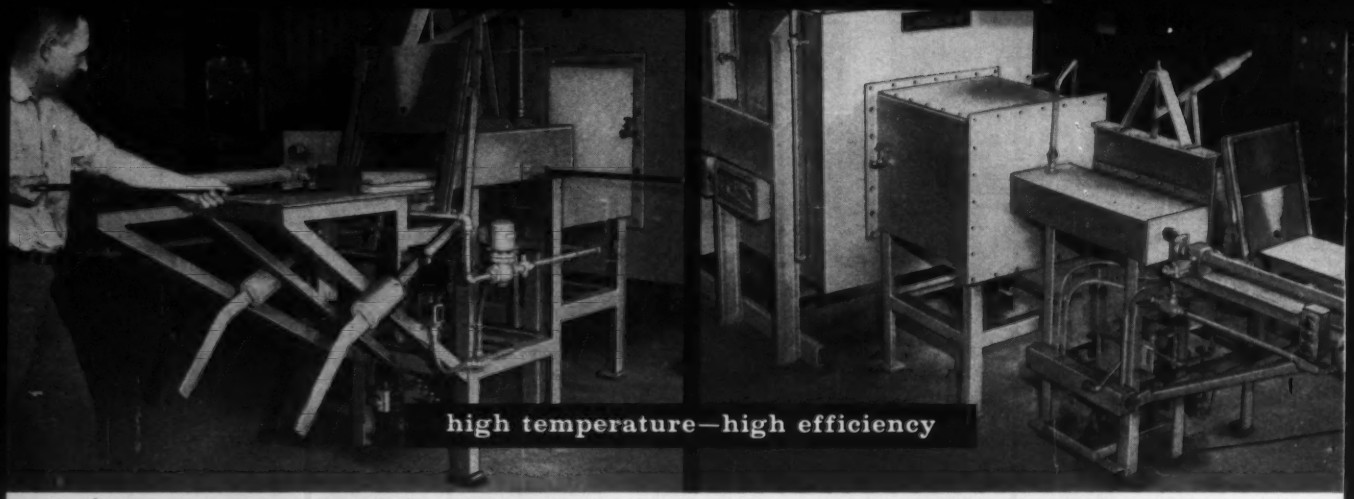
Cincinnati Hydraulic Shears include in the standard price many features which cost extra on competitive shears. Several of these are shown above. Combined with an exceptional range of shearing capacity in one frame, they make any Cincinnati Hydraulic Shear a profitable investment. Request Bulletin HS-1 for complete details and features.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

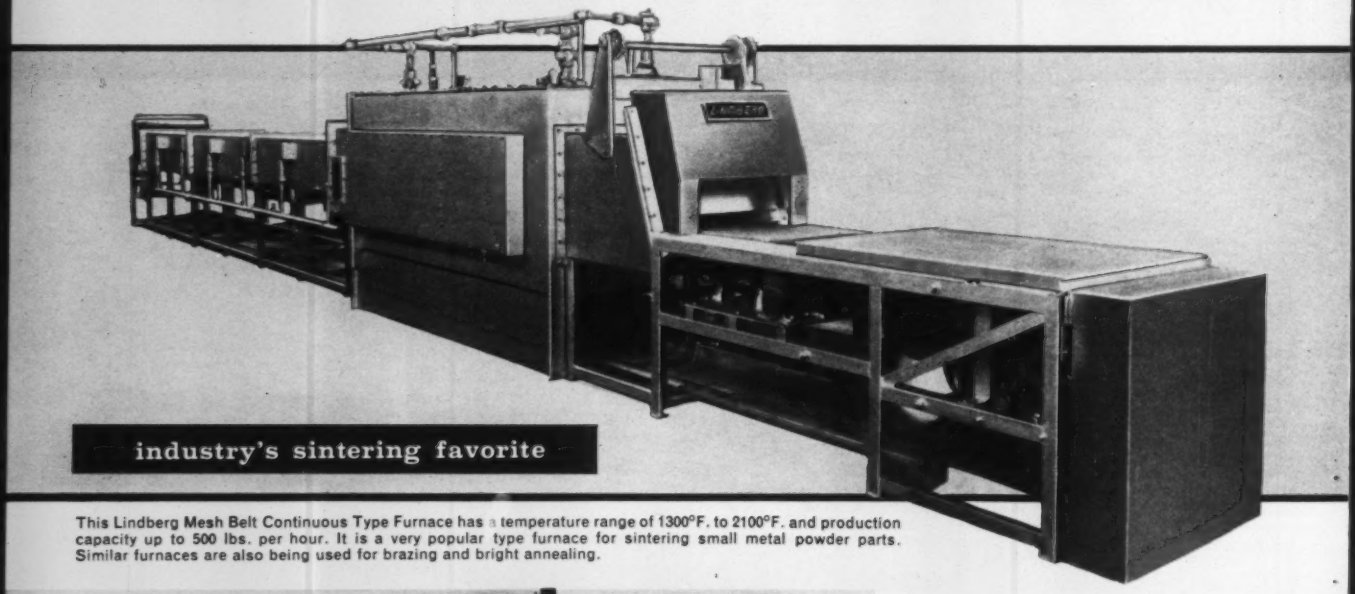
Cincinnati 11, Ohio, U.S.A.

United Kingdom: The Cincinnati Shaper Co., Ltd., Glasgow, Scotland

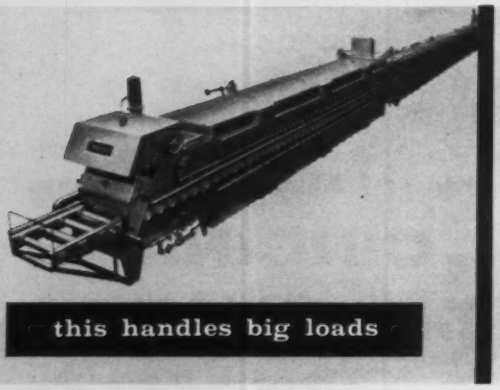


This new Lindberg Molybdenum Element Pusher Type Atmosphere Furnace has a maximum temperature of 3000°F. with 60KW input. It embodies high temperature refractories suitable for low dew point without muffle and is ideal for sintering stainless steel compacts in hydrogen or dissociated ammonia. Furnace provides side loading and discharge ports with purging chambers. Installation at right also shows conveniently located ammonia dissociator and control panels.

If your production processes require sintering you can depend on getting exactly the right equipment for your needs from Lindberg's comprehensive line of dependable, efficient, production-proven furnaces



This Lindberg Mesh Belt Continuous Type Furnace has a temperature range of 1300°F. to 2100°F. and production capacity up to 500 lbs. per hour. It is a very popular type furnace for sintering small metal powder parts. Similar furnaces are also being used for brazing and bright annealing.



Lindberg Roller Hearth Continuous Type Furnace handles loads up to 2200 lbs. per hour in temperature range 1300°F. to 2100°F., for bright annealing, silver brazing and sintering metal powder.

Lindberg Hand Pusher Batch Type Furnace has a temperature range of 1300°F. to 2500°F. Also sintering capacities from 25 to 300 lbs. per hour available.

For full information on the furnaces illustrated and Lindberg's complete line of sintering and brazing furnaces, just get in touch with your local Lindberg Field Representative (see classified phone book) or write direct. Please remember, too, that Lindberg offers a variety of Atmosphere Generators to provide, efficiently and economically, the proper atmospheres recommended for use with our sintering furnaces. Heat Treating Furnace Division, Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., Toronto.

LINDBERG
heat for industry

The Secret of Efficiency

More metalworking managers are changing jobs this year than in any year since 1947.

In fact, the total is probably the largest in our industry's history, but our figures go back only to 1947 when we started keeping track of the personnel announcements received for our Men of Industry Department. Since the first of the year, we have seen 25 per cent more than we did in the same period of 1960.

What's the explanation? Several account for the increase, but the basic one is this: Metalworking is driving for greater efficiency and recognizes that the place to start is with its people. Two hundred company presidents at an American Management Association seminar concluded: "People are industry's most important problem."

We tend to overlook that in this age of automation. We tend to pin our hopes for competence solely on machines, forgetting that people must invent, develop, and run them.

In these fat postwar years, we have even forgotten at times that the basis of U. S. industrial supremacy has been its efficiency. We are in danger of losing that leadership to other nations through slackness.

We see in the increasing number of job changes a sign that metalworking is returning toward the fundamental approach to efficiency—with people.

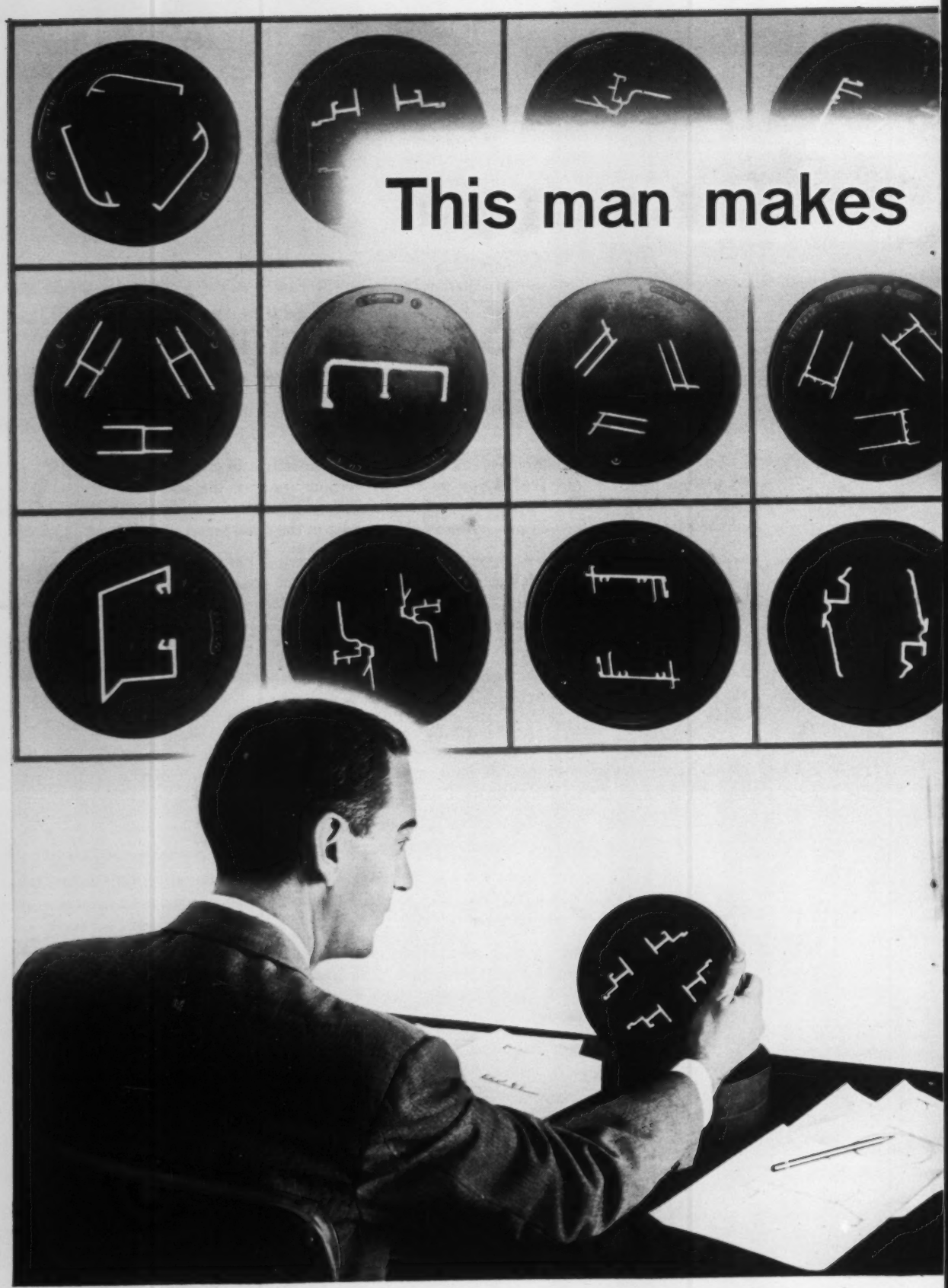
It's none too soon to go back to earlier standards of industrial fitness. We may even have trouble recalling what they were. To refresh your memory, here's how they appeared to one observer in 1924:

"American efficiency is that indomitable spirit that neither knows nor will be deterred by any obstacle, that plugs away with businesslike perseverance until every impediment has been removed, that simply must go through with a job once it has been tackled."

The author: Joseph Stalin.

John S. Morgan

ASSOCIATE MANAGING EDITOR


This man makes

aluminum extrusions in any shape you need!

He's your nearby independent extruder... Supplied with quality ALCAN aluminum by Aluminium Limited

Like so many manufacturers, you may find your best source of precision-made aluminum extrusions is local . . . an independent extruder near your plant!

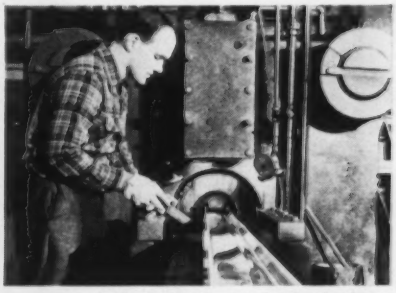
A specialist in aluminum and in the extrusion process, he can be a big help in engineering and design . . . producing the precision-made parts you need to your most exacting requirements. As for alloys, he offers you a wide range of aluminum alloys formulated by Aluminium Limited for specific end-product requirements.

Your nearby extruder also offers more attentive, more personalized service. Even on your smallest order, he gives you the quality, delivery and unit cost that assure your repeat business.

Call in your aluminum extruder on your next semi-fab order. Let him estimate on cost and delivery. Or, if you prefer, we'll be pleased to send you a list of leading extruders in your area.

Fast, reliable delivery. Because he's nearer to your plant, your aluminum extruder can arrange production schedules to suit your needs. He can also work more closely with you in estimating, planning and engineering.

Design help. Your nearby aluminum extruder is an aluminum specialist. Years of experience qualify him to help you develop the semi-fabricated aluminum shape best suited to economical fabrication and efficient performance of your product.



Modern equipment. Investigate the facilities offered by your aluminum fabricator—you'll find him well equipped to serve you. His facilities, experience, location, and his personalized service make him your best source of semi-fabricated aluminum products.

Aluminium Limited Sales, Inc., Dept. S-424
630 Fifth Avenue, New York 20, N. Y.

Gentlemen: Kindly send me a list of independent aluminum extruders in my area.

Name_____ Title_____

Firm_____

Address_____

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ALCAN

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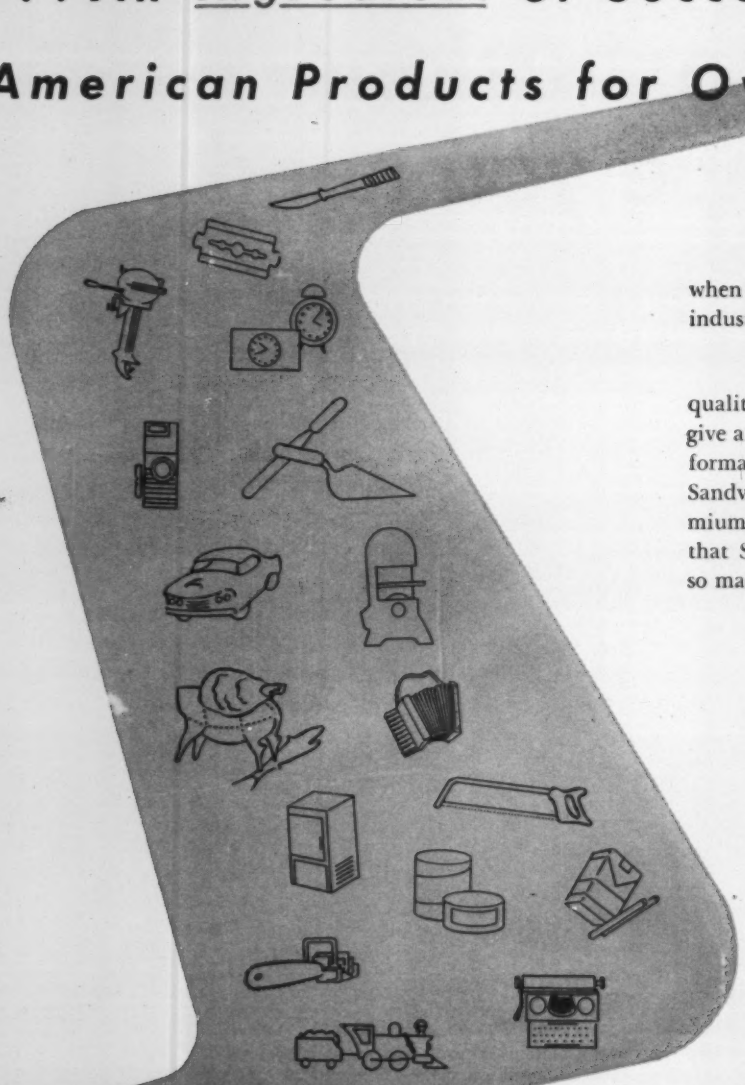
SANDVIK QUALITY

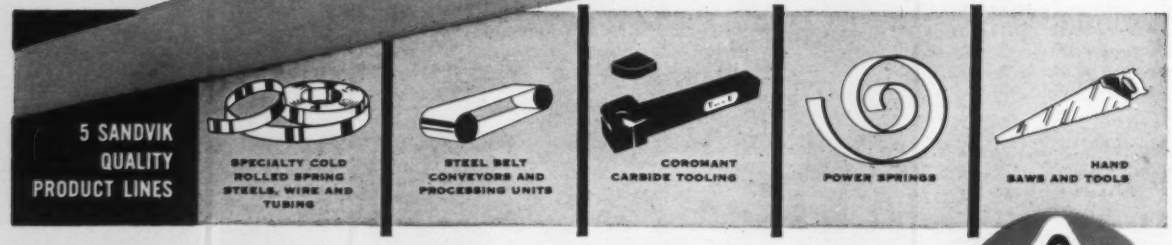
. . . An *Ingredient* of Successful American Products for Over 40 Years



As a matter of fact, *even before* 1919 when Sandvik was incorporated, American industry used Sandvik products.

The reason, then and now, is Sandvik quality—the ability of Sandvik products to give a consistent, predictable, premium performance. It is by this performance that Sandvik has earned its reputation for premium products. It is by this performance that Sandvik contributes to the success of so many American products.

Throughout the U. S. and Canada you'll find Sandvik offices and warehouses conveniently located to put Sandvik quality at your service.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SPECIALTY COLD ROLLED SPRING STEELS, WIRE AND TUBING
STEEL BELT CONVEYORS AND PROCESSING UNITS
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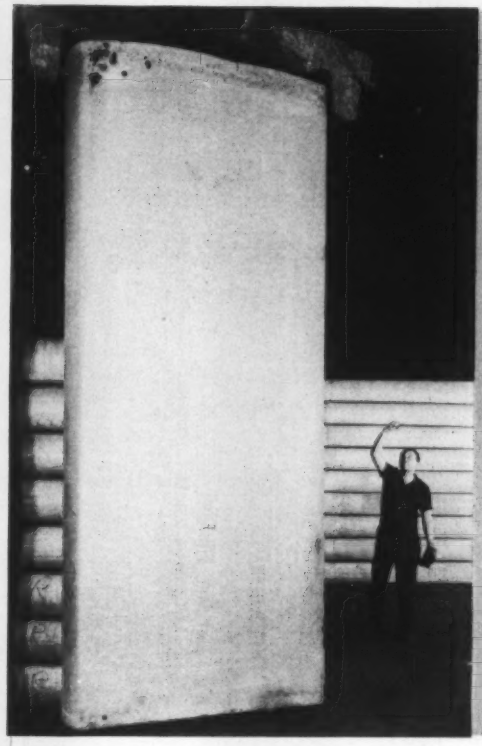
89-230



Prediction for the '60s

(Shipments in tons)

	1960		1965	
	Tons	% of Total	Tons	% of Total
Construction	611,000	30.6	924,000	25.4
Transportation	477,500	24.0	1,044,500	28.7
Consumer Durables	237,500	11.9	389,000	10.7
Electrical	197,500	9.9	474,500	13.0
Containers & Packaging	158,500	8.0	273,000	7.5
Machinery & Equipment	149,500	7.5	257,000	7.1
Destructive & Deoxidizing	66,000	3.3	76,000	2.0
All Other	96,000	4.8	203,000	5.6
Net Domestic Market*	1,933,500	100.3	3,641,000	100.0

Source: Olin.
*Includes imports but not exports.

As competition tightens . . .

Aluminum Realigns Marketing Sights

ALUMINUM executives are as confident as ever about their industry's growth prospects. But rapid growth and vigorous competition from other materials are forcing the industry to realign some of its marketing sights.

Says D. A. Rhoades, president of Kaiser Aluminum & Chemical Corp.: "In the past, our industry hasn't merchandised most effectively. Now we know where to concentrate our efforts, and we will step up our marketing to those fields where aluminum can best be used."

Look for the industry to rely on market development with a rifle instead of a scattergun. Its sights will be trained on such major targets as autos, building products, containers, shipbuilding, transportation, cryogenics, and military hardware.

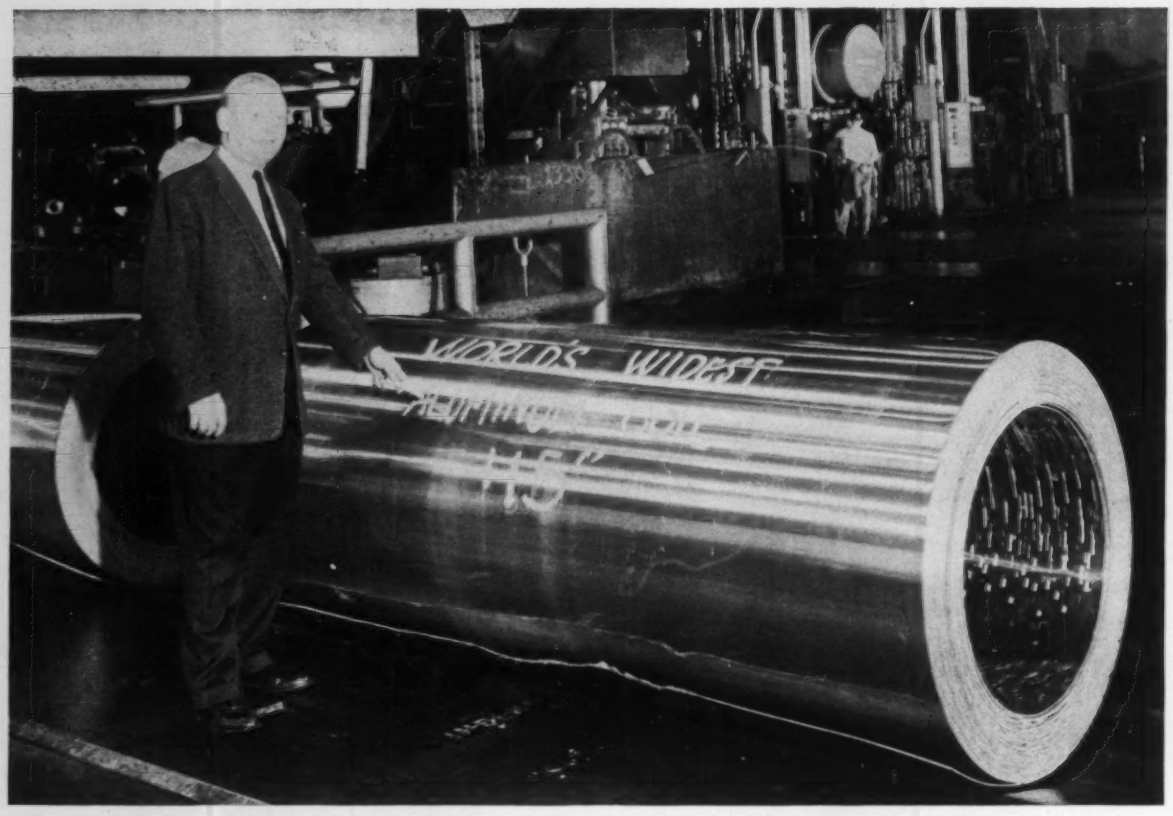
Here are the factors behind the shifts in sales strategy:

- The glamor days are over. Aluminum is no longer being touted as the cure for every materials problem. Aluminum men admit the metal has probably taken its last market by default.
- Competition has tightened, and it gives promise of getting even tighter in the days ahead. Producers of glamor nonmetallics, like plastics and ceramics, are attacking on many fronts. Producers of older nonmetallics such as concrete are making a comeback. Producers of other metals—steel, copper, nickel, lead, zinc—have sharply stepped up their marketing, promotional, and research and development activities.

More companies are scrambling for the buck. We now have six firmly entrenched primary producers instead of three: Alcoa, Kaiser, and Reynolds have been joined by Anaconda, Harvey, and Ormet (owned by Olin [formerly Olin Mathieson Chemical Corp.] and Revere Copper & Brass Inc.). Another company will probably join the ranks of primary producers before long.

In 1950, there were 63 secondary ingot producers; today, there are 84. Over that period, producers of foil have grown from 6 to 16 in number; makers of extruded shapes and drawn tubing from 39 to 133; sheet producers from 9 to 34.

- Rapid technological change has brought a demand from customers for more alloys, closer tolerances,



Customer demand for wider sheets and plates is met by 115 in. coils rolled on 120 in., four stand, hot strip mill at Reynolds Metals Co.'s Sheffield, Ala., Alloys Plant

greater variety of shapes, plus more engineering assistance. Customers have also become more cost conscious, more selective, more inclined to change suppliers or materials.

• Aluminum is now an international commodity. So it's subject to the pressures, considerations, and changes in marketing tactics that selling on the world level brings.

• **More to Customer**—To help get, keep, and expand markets, producers and fabricators plan to tempt users and designers with more services, better products, less expensive production methods, new and bigger mill shapes.

Here are some examples:

Says an Olin spokesman: "During the '60s, we expect to emphasize customer needs. Particular stress will be placed on the quality of our product and the service we give each customer. We expect to increase technical assistance . . . not only in design engineering . . . but in forming, welding, and bonding techniques. We expect to help customers to develop new items for manufacture and sale, and to come up with new ideas ourselves."

Robert T. Farrell, president of Fairmont Aluminum Co. (subsidiary of the Cerro Corp.), makes these points: "We are watching specialty items which will not be subject to some of the severe price competition now being experienced by the industry. We are also attempting to combine the advantages of different materials to come up with a new raw material. For example, we recently introduced stainless steel clad aluminum."

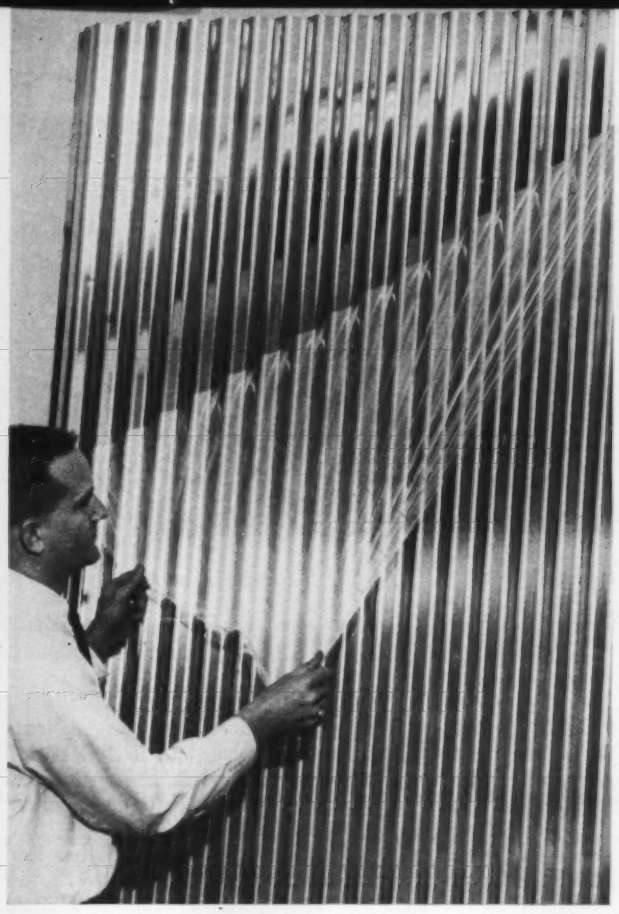
Eastern Rolling Mills Inc., New York, has trained its engineers to work closely with the sales force to try to reduce customer operating costs, says Herbert Barchoff, president. "We have a constant program to furnish additional alloys as they are developed. We are continually stressing our ability to produce on the low side of tolerance which gives the customer more feet per pound. Since the customer pays by the pound and uses by the foot, the obvious cost saving is apparent."

• **Product Mix Changing**—The aluminum industry is offering larger size mill shapes and a greater variety of products. The trend will continue.

"Five years ago," says David P. Reynolds, executive vice president-sales for Reynolds Metals Co., "we could produce coils only 60 in. wide. Today, we can roll them as wide as 115 in. In 1950, our widest foil was 37.5 in. Now we can roll it to 72 in. widths." Plates up to 165 in. wide and coils to 115 in. wide (before trimming) are being produced.

Look for even bigger products to be offered. Harvey Aluminum, for example, says it is going after larger shapes. "The structural use of aluminum is in the early stage, and the market potential is a big one. From size and design standpoints, we have the press capabilities to produce aluminum sections far beyond previous limits."

Many users of flat sheets are converting to coils because they are



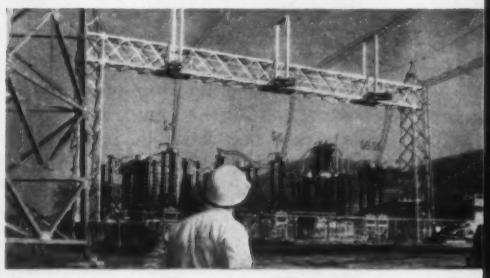
In one motion, Alcoa metallurgist peels plastic coating which protects corrugated aluminum sheets during shipment and fabrication

SLIT FOIL holds heat, frees moisture

SEAMLESS PIPE serves gas line

AUTOMAKERS build lighter engines

Paper clip dwarfs tiny rivets (some 90,000 to the pound), cold headed by Alcoa out of ultrathin wire for hearing aid assembly



UTILITIES erect aluminum systems

CARGO carriers feature aluminum

"We'll pinpoint markets"

D. A. RHOADES, president, Kaiser Aluminum & Chemical Corp.

"We'll pioneer end products"

R. S. REYNOLDS JR., president, Reynolds Metals Co.

"We'll compete world-wide"

LAWRENCE LITCHFIELD JR., president, Aluminum Co. of America

generally more economical. Customers are buying more specific blank sizes to eliminate scrap, says Mr. Farrell. Olin reports painted and enameled materials are growing in usage.

• **Which Direction to Go?**—One of the most perplexing questions facing the aluminum industry: Should it go more into the manufacture of selected end products or continue to put the emphasis on supporting customers?

The traditional approach has been to pioneer a new product, such as home siding, furniture, or irrigation pipe, then step aside as the product meets favor and sell sheets, extrusions, and other mill products to the companies that make it.

There may be a trend for primary producers and larger independents to move a little closer to the final customer in certain product areas. Such moves as Kaiser's recent purchase of the Kawneer Co. (aluminum shades and blinds) and Reynolds' pending acquisition of Tilo Roofing Co. add credence to this belief.

Primary producers are taking a more active part in the end application of their products. Says Reynolds: "In areas such as bridges, or electrical substations and towers, we feel that we can accelerate use of aluminum by supervising construction from start to finish almost on a turnkey basis. By doing this, we can make sure that the advantages of aluminum are utilized and that all the potential dollar savings are realized." Both Alcoa and Reynolds are participating in large scale redevelopment projects.

• **The Payoff**—Producers assess a few of their potentials this way:

Alcoa sees passenger car usage climbing from an average 62.8 lb per car in 1961 to 115 lb in 1965. "By 1970," says the company, "300 lb per car will not be extraordinary." If Alcoa's projections are right, and 6 million autos are produced in 1970, this would be a 900,000 ton market.

Packaging uses took 122,500 tons of metal last year, and the market should grow to 235,000 tons by 1965, believes Alcoa.

Reynolds Metals Co. makes these projections—period, 1959 to 1963: Residential aluminum siding, from 57,500 tons to 100,000 tons; combination doors, windows, from 90,000 tons to 100,000 tons; awnings and canopies (includes carports and patio covers), from 20,000 tons to 27,500 tons; foil insulation, from 4500 tons to 6000 tons.

Producers expect sales of aluminum pleasure boats to increase from 140,000 units in 1960 to 190,000 units by 1965. Alcoa sees foil wiring material achieving an early potential of 100,000 tons a year.

• **Growing Pains**—One of the industry's major problems: In essence, it has operated as a big job shop industry. The desire, of course, is to get markets that will allow the more economical, quantity production. Some success has been realized in areas like can and flexible packaging stock, conduit, and auto trim. The most notable example is building product sheets.

The desire for long runs has led to the so-called commodity pricing, a device theoretically employed to stimulate demand: A certain market is offered the product at a lower cost. In practice, commodity pricing has triggered a lot of bitter price fighting within the industry.

Aluminum people are becoming more vocal about putting profits back into such activities as research and development if the industry is to keep growing.

An upward revision in commodity prices will probably be the first symptom that prices are firming. The industry would like to put through an across-the-board hike later in the year, particularly with increased labor costs coming up. Such a move could only come if business shows a substantial increase.

Confidence is growing that 1961 sales volume may wind up at a pretty good level. Most producers believe it will be at least as good as 1960's, probably a few percentage points better.

Primary production, however, is better geared to sales than last year's; it will be about 100,000 tons less than the 2,014,000 tons turned out in 1960.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

STEEL's Washington Editor Jack Botzum (left) gets the economic views of Louis J. Paradiso, chief statistician, Commerce Department

GNP will rise above $520 billion this year and could hit $530 billion . . . if the recovery is to be permanent the initiative must come from private enterprise

Personal Income Rise Bolsters Recovery

THE REBOUND in personal income from the February low of $406.2 billion to $409.6 billion in March was a solid signal that our economy is pulling out of the recession.

That's the opinion of Louis J. Paradiso, chief statistician, Commerce Department, who believes that personal income is the "broadest indicator" available. He now feels that gross national product will climb above $520 billion by the fourth quarter.

The $3.4 billion gain in personal income ($409.6 billion is a seasonally adjusted annual rate) was caused partially by President Kennedy's program to speed the payment of national service life insurance dividends ($1.8 billion), but the rest was divided about equally between gains in salaries and wages of manufacturing and construction workers. Construction activity was slow in February, and the March upturn was expected, but the increase in the manufacturing segment was definitely healthy.

• **Growth Potential** — President Kennedy is figuring on personal income averaging about $410 billion to $412 billion this year, with a high of $415 billion in the final months, Mr. Paradiso points out.

The economist also believes that a GNP growth to a rate of $530 billion is possible, but that could cause trouble too—inflation. He already sees signs of scattered price increases in the components making up the wholesale price index. They signify recovery, but the increases must be contained to avoid inflation.

• **Self-Help**—Mr. Paradiso warns that the initiative in this recovery must come from private enterprise if it is to be permanent. Obviously, one indicator doesn't make a trend, so he will be closely watching business spending plans for new plant and equipment. He says 1962 capital expenditures must surpass the 1957 record of nearly $37 billion. The latest forecast for 1961 indicates a 3 per cent drop from last year's $35.6 billion.

The economist calls capital spending one of the most "dynamic" parts of the economy. It did not come back as it should have after the 1958 recession, and the recovery was "dampened." Now he hopes businessmen will see the turnaround taking place, feel renewed confidence in the consumer, and make plans for increased capital spending to take care of the growing need for products.

• **Tax Message**—The administration endorsed Mr. Paradiso's viewpoint in its tax message to Congress last week by calling for incentives to spur modernization of plant and equipment. If the message is heeded, capital spending this year could rise above last year's and go on to record heights next year. The speed of the improvement will be a factor in how much GNP will rise above the $520 billion rate by yearend.

The administration appears to be counting on a fairly slow improvement in spending this year, providing a solid base for recovery next year. Mr. Paradiso adds that without the jump in capital spending next year, "extra" pump priming types of government spending will have to be used.

• **Durable Goods Orders**—All the signs are present for a recovery in durable goods. A gain is apparent

JFK's $1.7 Billion Tax Incentive

PRESIDENT KENNEDY issued his much awaited tax message to Congress last week and suggested a two step approach to reform of depreciation practices:

1. A tax incentive program to be retroactive to the first of this year.

2. A major overhaul of the tax structure next year, including the long sought depreciation reform.

The plans would cut treasury revenues an estimated $1.7 billion.

Citing foreign competition and the need to increase productivity here at home, the President outlined these incentives: From your tax bill for 1961, you will deduct:

- 10 per cent of the first $5000 of new investment in plant and equipment.
- 6 per cent of such investments which are in excess of 50 per cent but not more than 100 per cent of your current depreciation allowance.
- 15 per cent of such investments which are in excess of current depreciation.

• **Spelled Out**—The 10 per cent on the first $5000 of new investment is described as a minimum credit and is desgined to help small business. The 6 per cent credit is designed for those firms which lack cash to modernize above the level of current depreciation allowances. The most credit one corporation or individually owned business can get is 30 per cent of its tax bill for the year.

Eligible investments are limited to new plant and equipment spending and apply only to assets with a life of six years or more. Public utility investments will not be eligible for tax credit except in the case of transportation equipment or facilities. Residential construction, apartments, and hotels are also excluded.

Anticipating arguments from liberals that expansion of U. S. industry is not what is needed now, the President said the tax credit program will result in the creation of 500,000 new jobs in the U. S. Affected particularly will be the construction, lumber, steel, cement, machinery, and other capital goods industries. The President also recognized "hardships" sometimes caused by modern living, particularly automation, but said his administration will take care of that problem through the Area Redevelopment Bill; a strengthened U. S. Employment Service, and more assistance to the unemployed.

Anticipating criticism from industry that what is needed now is a real reform of depreciation practices, not a shot in the arm approach like the tax incentive plan, the President said adoption of his proposal "would in no way forego later action on depreciation." The President counts on Congressional support by increasing taxes in such areas as special privilege to offset the $1.7 billion revenue loss from the tax credit plan.

The President hinted that he would veto any Congressional action which would not take into account the full content of his message. He is determined to balance revenue losses with revenue gains, and told Congress: "I wish to emphasize here that (the recommendations) are a set . . . and that both revenue and equity as well as the interrelationship of the proposals should be considered as a unit."

PERSONAL INCOME . . .

in the latest figures, says Mr. Paradiso, but a couple more months of statistics will be needed to verify an increase. Durable goods orders can get "bunched" into one month and give false signals, he warns.

Defense orders through the end of fiscal 1961 (June 30) are certain to stimulate confidence. Almost $24 billion in orders for procurement, research and development and other categories of defense hardware are scheduled to be let in fiscal 1961. But the Defense Department "still has a long way to go" to hit the mark, so orders will be coming fast the rest of April, May, and June.

• **Employment**—As the labor force grows, employment should continue on the up side, but the administration remains concerned about unemployment, even if the recovery is fairly fast. Mr. Paradiso believes 6 per cent of the civilian labor force (seasonally adjusted) will be out of work with the recovery to $520 billion GNP. He reckons 4 per cent unemployed as what we are talking of when we speak of "full employment."

He thinks it is "important" to encourage the attainment of "full employment" as rapidly as possible without inflation.

• **How Vigorous?**—A good sign of the recovery is the turnup of hours worked and the strength in nonfarm employment. Hours worked is usually among the first signs of a recovery, as manufacturers see better things ahead and start slowly to rehire.

The Census Bureau reported private new home starts in March were at a seasonally adjusted annual rate of 1.2 million—a jump of 8 per cent over February and about 15 per cent ahead of year ago levels.

Retail sales are not up much yet, but little weakness is being exhibited. Sales of automobiles are still the big question.

What'll it take to make the upturn "vigorous"?

Mr. Paradiso thinks: "I'd like to see personal income rise about $2 billion next month—without unusual help like the government speedup of insurance payments to veterans."

Where 7,017 Miles of Pipeline Are Stalled at the FPC

(Percentages refer to pipeline applications)

Applications being analyzed by FPC	2%
Applications requiring additional information	24%
Applications awaiting assignment of hearing date	8%
Hearings in progress	11%
Hearings concluded, awaiting examiner's decision	13%
Cases dependent on decisions being made in related cases, or applicant waiting while rate case appeal is being heard	18%
Awaiting final FPC O.K. (which comes in 30 days)	5%
Granted temporary certificate (final approval almost automatic)	19%

Source: Federal Power Commission, as of January, 1961.

Pipeline Construction May Get Spur

APPLICATIONS for an estimated $870 million worth of pipeline construction are log jammed by the complex procedures of the Federal Power Commission. Involved are 7017 miles of pipeline the natural gas industry wants to build.

President Kennedy is determined to get things moving. In his special message to Congress on the regulatory agencies of the government, he noted: "Whether it be transportation, communications, the development of our natural resources, the handling of labor-management relationships, the elimination of unfair trade practices, or the flow of capital investment . . . these agencies and their performance have a profound effect upon the direction and pace of our economic growth."

• **Bypass the FPC?**—The President proposes to bypass FPC regulations on those applications "which seek merely to enlarge, extend, or replace existing facilities for the benefit of existing customers only, whenever it is assured that its action will not impair the preservation of reserves necessary to supply those consumers, or permit the indiscriminate invasion of one supplier's territory by another."

At the same time, the White House seeks to hold receipts from such rate increases in escrow until final decisions are made by the commission. This might cut the utilities' cash on hand and tend to reduce capital spending somewhat. It suggests too that small natural gas firms (producing less than 2 billion cu ft per year) should be exempt from the FPC regulations.

Reaction from the gas industry to the message was immediate. A Washington spokesman for a firm with millions of dollars worth of applications stalled in the FPC told STEEL: "With the mess at FPC, the President has suggested some good reforms. Something has to be done; everybody is suffering—industry and the consumer alike."

Checking at the FPC, STEEL learned that the agency has no idea how much of the $870 million in applications would meet the President's test, but the agency commented that rarely is an application turned down because of the reserve rule.

The President's special adviser on regulatory agency matters, Dean James M. Landis, has said the FPC already has the power to speed up its procedures in Section 7 (f) of the Natural Gas Act, but the commission has sought special legislation from Congress before acting.

• **More Decision Makers**—The President has also recommended the addition of two more commissioners to speed up decision making on rates and construction. Dean Landis wants hearing examiners at FPC given the right to make decisions too—without taking every case upstairs to the commissioner level.

• **Favorable Effects** — The over-all effect of the Kennedy recommendations appears favorable to pipe and equipment suppliers to the natural gas industry. An upturn in pipeline construction is assured this year, says a major oil company source, if Congress grants the President's wishes.

With the season advanced, most of the splurge will come next year, especially if Congress doesn't act until June, which seems likely.

The New Antitrust Chief's Attitude

"A deliberate or conscious violation of antitrust laws is not a mere personal peccadillo or economic eccentricity, but a serious offense against society"—Lee Loevinger

THE NEW Antitrust Division chief of the Justice Department, Lee Loevinger, was asked what he thought was the most important antitrust development in the last year. He told the American Bar Association: "The election of John F. Kennedy."

What Mr. Loevinger calls "an infusion of a new spirit of energy and dedication into the Justice Department" amounts to a return to the attitude of "trustbusting" on which our present antitrust laws were founded. Lawyers at the Justice Department are saying they feel free to treat their cases "by the letter of the law" without fear of having their work go neglected by their superiors for real or imagined political reasons.

They point out that President Kennedy is perfectly willing to have the Antitrust Division fail to win a case, where other administrations have sought to maintain a high batting average. So the new appointees at the Justice Department will be taking on more of the giants of industry where they see possible antitrust violations.

Filing a case will no longer depend upon having it all wrapped up first.

● **ANTITRUST VIOLATIONS AND CRIME**—Never before has it so forcibly been brought to the attention of businessmen that an antitrust violation is a crime. Mr. Loevinger says he will lay to rest some of ancient "shibboleths" of antitrust law: A violation is not a normal business risk, whether intentional or not. Furthermore, criminal sanctions in the law should not be applicable only to the corporations, but to the individuals involved within the corporation. Mr. Loevinger says that in the past, some industrialists have regarded antitrust violations as of no more magnitude than parking tickets.

He warns that the Philadelphia electric cases properly present the Justice Department's attitude toward violators. "Conspiracy to violate the antitrust laws is economic racketeering," he says. "Those corporate officials caught will be treated as 'criminals,' and the Antitrust Division will seek 'as severe a punishment as we can persuade the courts to impose,' " maintains the new antitrust chief.

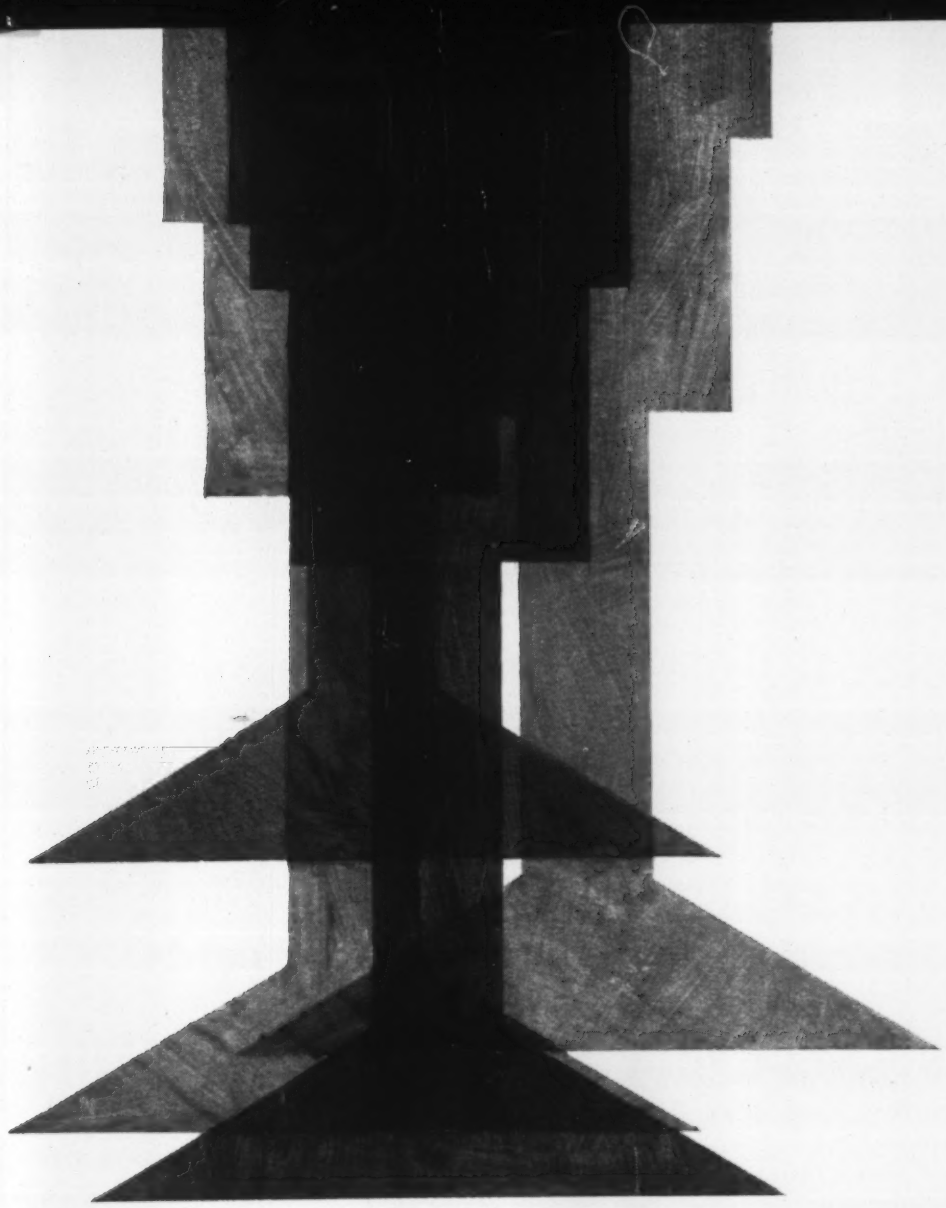
● **NO MORE SPECIAL TREATMENT**—Mr. Loevinger offers another warning to businessmen, government, and Congress alike. There will be no more special treatment of industries or companies for reasons deemed to be above the application of the antitrust laws. In the past, special legislation has been sought, or special government departmental rulings have been made which allow exceptions to the law. He sums up this point this way: "We have seen no persuasive case for compromising any antitrust principles in special cases."

● **PRICE FIXING EMPHASIS?**—Other sources within the Justice Department tell STEEL the public may have received the wrong impression from Attorney General Robert Kennedy's recent pronouncements about the effect of the electrical case judgments on prices. Says one top lawyer: "We have no intention of concentrating on price fixing cases. That aspect of the antitrust laws will simply be re-emphasized, because under the previous antitrust chief the emphasis may have been too much on merger cases."

The Kennedy administration is extending its interest in prices beyond the level of antitrust action. For example, the Interior Department has announced what it calls "a noncollusion bidding clause" will be put into its contracts with private industry. By the act of submitting a bid, a contractor will now automatically certify the bid has been arrived at independently, and that its contents have not been revealed outside the bidder's company.

● **FTC SPEEDUP ANNOUNCED** — Paul Rand Dixon, chairman of the Federal Trade Commission, is carrying out another aspect of the new administration's program to crack down on business violators of the law. Announcing "we're going to move faster at FTC," the chairman has ordered that each FTC case will have one man assigned to it to see that it is moving through the FTC administrative processes as fast as possible. Some of the current hearing schedules appear to have been scheduled for the benefit of lawyers and witnesses traveling "by horseback and canal barge," quipped Mr. Dixon.

Giving one man the responsibility of one case's progress, of course, makes him stand out so there will be little footdragging at the commission now.



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480° F.	1740 psi	8500 psi
840° F.	1395 psi	9030 psi
1200° F.	1925 psi	10050 psi
1560° F.	1700 psi	10750 psi

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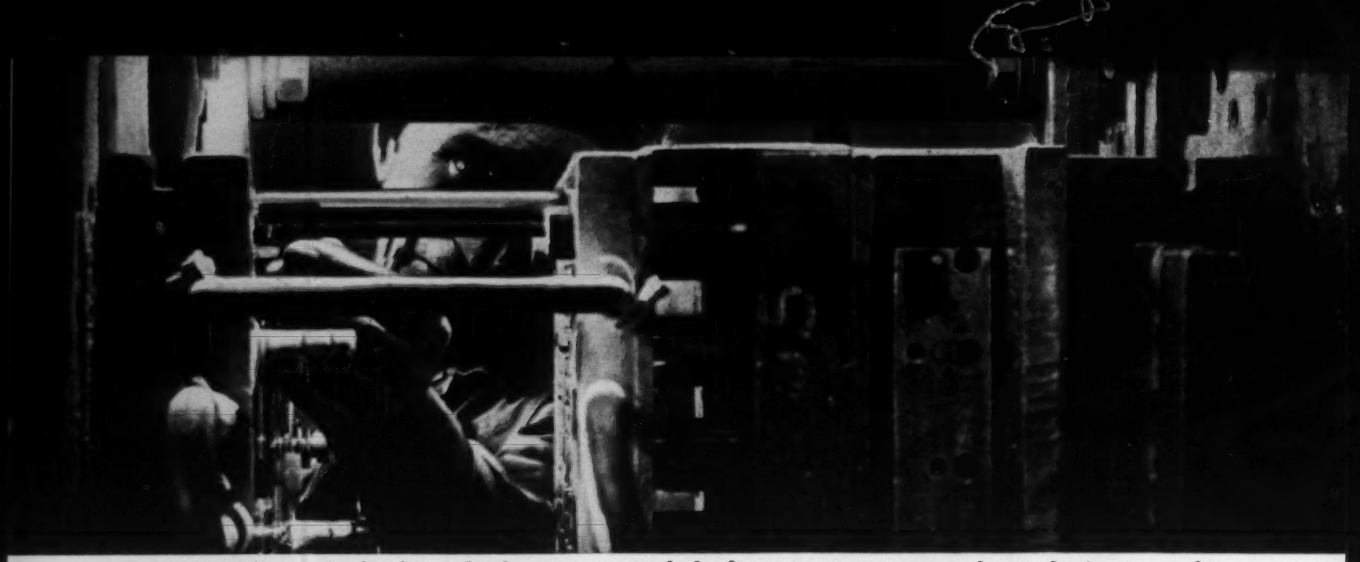

Shell Tellus Oils are refined and formulated to meet exacting hydraulic service requirements, such as in this forming machine.

PHOTO COURTESY ATLANTIC PLASTICS INC., STAMFORD, CONNECTICUT

BULLETIN:

Shell provides a quick 6-point check list for hydraulic oils: Use it to pick the right oil for your needs

Selecting the proper hydraulic fluid for your equipment can be one of your most important decisions. And it can pay off in many ways. Less down time. Lower cost per unit. Longer equipment lite.

Here are six bench marks to help you pick the best hydraulic oil for your plant requirements.

1. Does it have good oxidation stability? Oxidized hydraulic oil can form gums, lacquers and other deposits which may foul moving parts. Shell Tellus Oils are carefully refined to remove unstable, sludge-forming components, then fortified with a Shell-developed oxidation inhibitor.

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They also contain a selected inhibitor to combat effects of moisture that might be in the system.

3. Does it fight rust and corrosion? It is difficult to exclude all moisture from a hydraulic system. And moisture can form troublesome rust. Shell Tellus Oils have been carefully compounded to resist corrosion.

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A message to manufacturers of hydraulic equipment

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SHELL

A BULLETIN FROM SHELL
–where 1,997 scientists are working to provide better products for industry

Our Pressure from Idle Capacity

DURING the eight year period from the beginning of 1953 to the end of 1960, total U. S. production measured in uniform 1959 dollars has been more than $250 billion below reasonably full production and manyears of employment."

That declaration by Leon H. Keyserling, former chairman of the Council of Economic Advisers, points up the staggering waste of resources in the U. S. Most metalworking industries operated at less than 70 per cent of normal capacity last year (see Pages 106, 107), and few are faring much better now. Many industries could have manufactured their entire 1960 output with half their plant and equipment—provided it was the most efficient half.

Such idle capacity creates a downward pressure on prices via competition and an upward pressure on costs. Profits are pinched in the middle. But some basic changes in attitude on the part of management can help to alleviate the pressure from both directions. One change is to add guts to your pricing formula. The other is to trim overhead costs. STEEL devoted its Apr. 17 issue to a special study on price fighting and how to stop it. This article will present some approaches to bring overhead costs more in line with operating rates.

Pressure on Profits

Since most metalworking industries are vital to national security, it is desirable to have some excess capacity so that any national emergency can be met.

But metalworking has far more than the necessary amount of overcapacity. And that situation is a serious detriment to profitability. For example: Dun & Bradstreet Inc. makes these comparisons of net profits as a percentage of tangible net worth in industries that have substantial capacity:

	1947-51	1955-59
Fasteners	14.5%	9.0%
Industrial Machinery	13.6%	8.7%
Metal Stampings....	16.0%	9.0%
Machine Shops	11.7%	7.7%

Even youthful and fast growing industries have excess capacity problems. Take manufacturers of printed circuit boards. Sales in 1960 rose about 36 per cent above the 1959 level, but profits fell about 20 per cent. Overcapacity was the culprit, the Institute of Printed Circuits reports. It says the average firm en-

% of Capacity Operating Rates in 1960

Machine Tools

50%

Steel Foundries

59%

Drop Forgings

59%

tered 1961 at about 60 per cent of capacity.

One reason why such situations develop: Price pressure. Management's desire to use its idle capacity leads to the acceptance of orders at prices near or even below costs.

As W. L. Wearly, president, Joy Mfg. Co., told STEEL: "Running below capacity is the single factor that's most detrimental to price—and profit—stability. We're running at 50 to 70 per cent of capacity in most plants, but a few are doing no better than 40 per cent. That really puts a squeeze on profits."

The other side of the problem is higher unit costs. The unused facilities add cost to the products made on the facilities in use. Listen to Mr. Wearly: "By capacity, I mean personnel as well as facilities. In 1957, our best year, we had sales of $131 million. Last year's sales were $102 million. But we're probably staffed to handle $115 million. We have sufficient plant and equipment to do $160 million worth of business annually. And it doesn't make much difference whether your top executives are supervising 3000 people or 5000."

Are 'Fixed' Costs Fixed?

"There are costs a lot of people think are fixed, but when you get right down to it, they can be moved a bit," asserts Alan E. Phin, vice president-finance, Babcock & Wilcox Co.

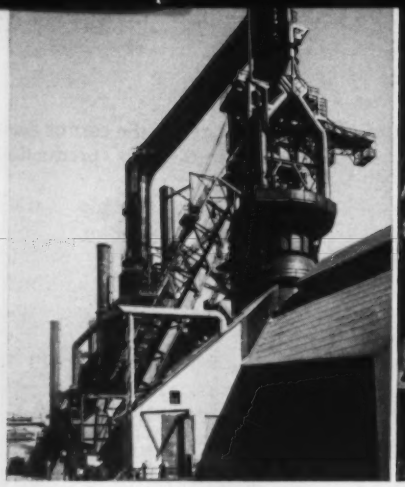
His firm has proved the validity of that statement by accomplishing the enviable goal of increasing profits on reduced sales in two consecutive years. From a 1958 mark of $366 million, sales dipped 9 per cent in 1959 and another 6 per cent last year—to $311 million. But the firm's net income rose from $2.11 a share in 1958 to $2.58 in 1959 to a record $2.88 in 1960.

STEEL asked how B&W did it. "Primarily through continued general improvement in operating efficiency," answers M. Nielsen, company president. He points to "better utilization of personnel" and "savings in production costs through large capital investments." Also significant: "Despite competition, we hold out for reasonable prices."

The firm has taken a close look at costs often considered fixed, found elements of variable costs in them, and assigned top brainpower to study ways to bring the costs into line with sales volume.

The firm has set up a system under which each of its divisions and subsidiaries has a profit improvement committee. It's composed of the division head, the principal department heads, and the division comptroller. The group supervises and co-ordinates projects which are carried out "at the lowest level possible" for top efficiency and effectiveness.

These groups have analyzed such areas as: 1. Integration of processes and personnel. 2. Inventory control. 3. Purchase of new equipment. 4.

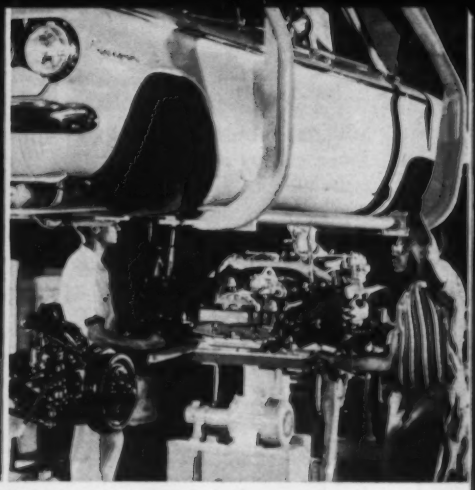


Steel

67%

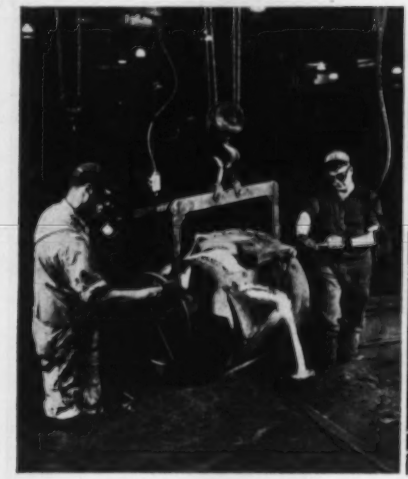
Aluminum (primary)

80%



Automobiles

83%



Gray Iron Foundries

58%

Screw Machine Products

61%

Refrigerators

40%

Conveyors

55%

Farm Tractors

50%

Pipe Fittings

50%

Material substitution possibilities. 5. Make or buy decisions. 6. Product redesign. 7. New products and new markets.

When an area is selected for improvement, it's given a project number and assigned to an individual who shepherds the improvement program and reports on progress to the profit improvement committee.

Mr. Nielsen spearheads the drive. He meets with the division heads and subsidiary presidents. He emphasizes that the company is always willing to invest in capital improvements that will increase profitability. In the last five years, the firm has spent $67 million for new facilities, improvement of facilities, integration of operations, and development of new processes and equipment. B&W's improved profitability testifies to the soundness of making substantial capital investments even when capacity exceeds demand.

As President Kennedy told the National Industrial Conference Board: "Gleaming new factories and headlines about automation have diverted our attention from an aging industrial plant. Obsolescence is slowing down our growth, handicapping our productivity, and worsening our competitive position abroad."

It takes "no magic formula" to improve your competitive position, says Mr. Phin. He says the key is to "work continually in all the areas." In that way, B&W has avoided the tendency, when business gets bad, to lop off heads and make across-the-board budget cuts. Says Mr. Phin: "We have a continuing program of weeding and correcting for unnecessary costs. We're not going to reduce our research effort, curtail personnel training, or cut pencils in half to get the results we want."

One move to trim overhead costs that is paying off well was taken in 1958. About 200 executive, sales, and engineering employees of the boiler division were transferred from the New York headquarters to the manufacturing facility in Barberton, Ohio. The consolidation reduced costs of travel, mail, and telephone, while permitting more effective coordination of activities.

Profitability Accounting

"Accounting has allowed itself to be so concerned with accurately telling the story of what has happened that it has lost its perspective, its ability to assist a manager in determining why it happened and what should be done about it." That's what Robert Beyer, executive partner, Touche, Ross, Bailey & Smart, told an American Management Association seminar.

He points out that too often the accounting system is designed more for external reporting than as a tool for internal use. He suggests the adoption of a technique called profitability accounting and control which integrates the accounting control tools into one system. It reports the results of operations for internal purposes in such a way that they are fully reconcilable with results under custodial accounting, "so that in a sense, management can have its cake and eat it too."

This technique is especially helpful because it is based on the principle that no costs are fixed. Its thesis is that most costs contain fixed (or standby) and variable elements. Reporting techniques are so established that management can take a more accurate aim at overhead costs and bring them more into line with the current operating rate. It permits preventive — not only corrective—action.

The Rucker Principle

Neil Barbu, vice president, Strong-Narovec Co., Cleveland consulting firm, says all costs are variable except depreciation (and rental), personal property taxes, and insurance —and even those can sometimes be moved somewhat, he points out. So, as the operating rate falls, overhead costs can be cut back in a more direct relationship than is generally achieved.

One of the more common problem areas is indirect labor, says Mr. Barbu. He suggests that the Rucker principle can be used to alleviate that problem.

Named for its originator, Allen W. Rucker, president of Eddy-Rucker-Nickels Co., Cambridge, Mass., consulting firm, the principle holds that total employment cost of hourly workers should be a constant percentage of production value added. (Production value added is the difference between dollar volume of sales and dollar volume of purchased items.) Using that principle, you can relate the cost of each labor classification to production value.

When the relationship varies, it's a red flag to take action.

Pohlman Foundry Co., Buffalo, has been using the Rucker principle for 11 years. Says Daniel Pohlman, vice president-sales: "We have not lost money in any month in those 11 years, although our operations have been as low as 50 per cent of capacity."

The PACE Plan

Northrop Corp.'s Norair Div., Hawthorne, Calif., has come up with a program called PACE (for Performance And Cost Evaluation) that helps to keep costs in line with operating rates. Basically, it's a statistical measure of group effectiveness in performing assigned tasks. It tells management and supervisors at a glance the percentage of total production capacity at which a group or department is operating. It correlates that percentage with other cost-controlling factors such as percentage of schedule produced, percentage of personnel change, budget realization, quality, and parts shortages indexes in a single weekly, cumulative chart.

Is it effective? In 1958, the year the program was introduced, Northrop's sales fell about 9 per cent, but profits climbed 23 per cent.

Northrop Corp. officials hesitate to attribute any definite portion of that improvement to the PACE program, but they agree that it made an important contribution.

PLAN FOR PROFIT GROWTH

Pressure from Depreciation

On May 8, STEEL will analyze prospects for reform of our depreciation laws in 1961. For a free copy of any or all articles in this series (appearing biweekly since Jan. 16) write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

EF Walking Beam Furnaces

For heating copper and copper alloy cakes preparatory to rolling.

Also ferrous and non-ferrous billets preparatory to rolling, piercing or drawing.

The EF direct gas fired walking beam conveyor type furnace, pictured above, has capacity to heat 40,000 pounds of copper and copper alloy cakes per hour to 900° C; can handle cakes as large as 26″ x 8″ x 72″ long, weighing 4800 pounds each.

These furnaces can also be used to heat ferrous and non-ferrous billets and rounds preparatory to piercing, rolling, drawing, extruding and other hot forming operations. Usually furnished with completely automatic handling equipment. Raw stock is taken from storage, conveyed to the furnace, carried into the furnace, heated, discharged and conveyed to the next process in one completely synchronized automatic operation.

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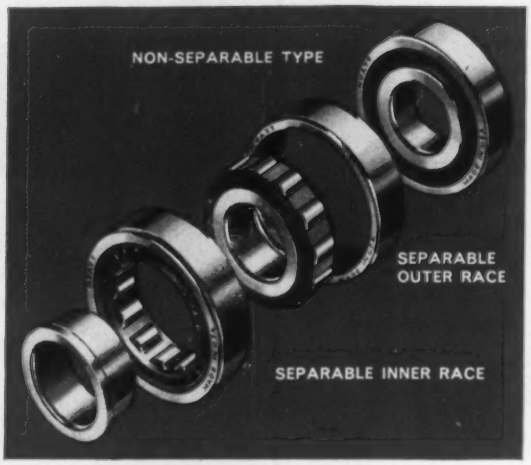

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The fundamental difference in the service you get from one supplier or another can usually be traced to people.

HYATT has been fortunate to build an organization which contains the kind of people who make this difference apparent in the way that they make, sell and service Hyatt Bearings.

No one, for example, knows more about cylindrical bearings than Hyatt Sales Engineers. The experience and knowledge of these trained bearing specialists regularly save vital man-hours and dollars for customers in almost every kind of industry.

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3

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HYATT BEARINGS DIVISION, GENERAL MOTORS CORPORATION, HARRISON, N. J.

University of Michigan study compares . . .

How Captive vs. Job Shop Costs Vary

MAKING the trip over the hill to the poorhouse in a Cadillac might be one way of describing the situation the independent tool and die shops find themselves in today. They have plenty of capital assets, but they're still going broke.

The Detroit Tooling Association claims the chief reason is that expanding captive shops are forcing the jobbing firms to compete for business at prices that barely permit a profit. The growth of captive tooling is a more serious threat than the purchase of foreign or out of state tooling, thinks the DTA. It has financed a study at the University of Michigan by Profs. William A. Paton and Robert L. Dixon, who have investigated make or buy decisions in automotive tooling.

The university study claims that although captives' direct labor costs are 25 to 45 cents an hour less than jobber rates, the captive shops have higher overhead costs, ranging from 250 to 400 per cent of direct labor costs. Professors Paton and Dixon add that the comparable overhead rate for the independents runs from 70 to 130 per cent. "In a typical job shop, an average straight time hour of labor costs $7 to $8, including overhead. Comparable costs in a large captive shop may approximate $14 an hour," claim the professors.

• **Profits Squeezed** — Even with lower costs, the competitive pressure from captives is causing the jobbing shops to bid for work at rates of $6 to $7 an hour. They claim they need at least $7 to $7.50 to break even. One of the smaller but highly reputable shops tells STEEL that firms with annual sales of $1 million to $2 million generally need pretax profits on sales of 20 to 25 per cent. Larger shops with sales in the $10 million a year class probably can operate profitably on margins of 10 to 12 per cent.

Adds another manager: "We shoot for all the profit we can get because this is a high risk business and there's a lot of art to it that's hard to measure. We never know when we'll have to put 200 or even 2000 more hours on a job after it's delivered. Sometimes we can negotiate with the customer to recover these costs, but usually we just have to swallow them—even when the additional work is the result of a customer error."

Many shops manage to stay open by digging into depreciation reserves. That affects their efficiency because they find it more difficult to replace equipment. In the last three years, more than 30 tooling firms in the Detroit area have closed. DTA members say May will see another rash of auction notices in local papers, followed by bankruptcy petitions.

• **Captives Grow**—The Paton-Dixon report says that inept management, lack of capital, and failure to meet delivery dates are part of the reason behind the closings. But they point out that the mortality rate among the independents has been matched by the growth of large captive shops. General Motors Corp., particularly, seems to have expanded the tooling facilities of its Buick, Oldsmobile, and Pontiac Divisions.

Not everyone agrees that captive operations have grown. Says George Eaton, executive vice president, National Tool, Die & Precision Machining Association, Cleveland: "I think that more of the large dies that indicate styling are made inside. Other than that, we have no reason to believe that from a policy standpoint, the auto companies intend to make more of their own tooling." About 100 of the asso-

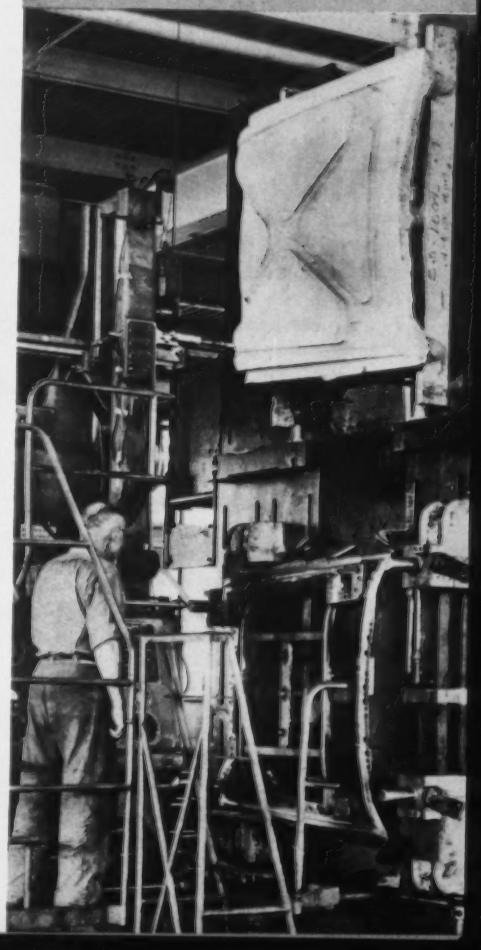
Cost Breakdown on Typical Tooling Job

CAPTIVE SHOP—

Direct Labor (30,000 manhours at $3.45 per hour)	$103,500
Overhead (250% of direct labor)	$258,750
Total Cost	$362,250

INDEPENDENT SHOP—

Direct Labor (30,000 manhours at $3.75 per hour)	$112,500
Overhead (100% of direct labor)	$112,500
Total Cost	$225,000



U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,242
3 Mo. Totals	1,188,201	2,002,230
April		582,909
May		611,226
June		613,147
July		434,377
August		305,527
September		407,685
October		617,816
November		597,132
December		522,239
Total		6,694,288

Week Ended	1961	1960
Mar. 18	71,083	145,852
Mar. 25	87,808	137,385
Apr. 1	101,571	147,830
Apr. 8	93,730	133,460
Apr. 15	114,576†	135,412
Apr. 22	120,000*	144,886

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

ciation's 1000 member firms are in Detroit.

• **Question Motives**—Whether it's policy or not, one question remains in the minds of most DTA members: Why do the auto companies build up shops that charge $14 an hour, then use those facilities as a lever to squeeze profitless prices out of jobbing shops? The jobbers association points out that the automakers are hurting themselves in the long run because they are eliminating tooling capacity that's sorely needed when major programs come along.

An executive in one auto company agrees that captive operations have grown and that their true costs probably are as high as the Paton-Dixon report states. He admits they aren't yet as skilled or as efficient as the jobbers. And this manager makes one more effective point: "If we've built up our own capacity, it's because we just can't afford to gamble on getting tooling from some guy who jacks up prices when he knows we're in a bind, then doesn't deliver on time! I know it's tough on the legitimate shops, but from our standpoint, tooling costs are only about 5 per cent of the total cost of getting a car to market. We can't play games with some vender for a $5000 fixture or even a $250,000 panel die if it means losing several million in sales because we're late starting the model run."

• **The Middle Road**—The Paton-Dixon report scoffs at styling secrecy: "By the time work reaches the tool and die shop, it is too late for a competitor to pirate it successfully." In discussing the study with STEEL, Professor Dixon implies that the independents may have to boost their efficiency and get used to operating on lower profit margins. The report suggests that in addition to maintenance, captive shops legitimately can do their own tooling for research projects and as insurance against lack of capacity or late delivery, although that may pose a cost penalty. They also can handle "fill in" tooling on a cash overhead basis. But Professors Paton and Dixon believe that other tooling can be done more efficiently and at less cost by the highly skilled jobbing shops that can pool their talents to solve problems.

Meanwhile, some 6500 men in the DTA's 160 member shops are finishing up the meager 1962 tooling programs. That is about 60 per cent of the available work force. The number of jobs provided by those shops has shrunk from 12,500 to 10,000 in a few years.

With a total capital investment of $300 million and with 40 million tooling hours available each year, DTA members are organizing to sell and promote their skills outside the auto industry. The association is wooing defense, appliance, electronics, and office equipment industries. It's seeking jobs from farm implement manufacturers and from meat, glass, and pharmaceutical firms. Currently, about 30 per cent of the volume in those shops is nonautomotive compared with only 10 per cent in 1956.

• **Face Test in Fall**—Most of the tooling for 1963 models will be released this fall. The program will be one of the largest in recent years, possibly equal to the record 1956 releases. How it's handled by both sides may be a decisive factor in determining whether or not captive shops will continue to expand.

Illinois Doctor Develops Aeromobile

A SIMPLE but highly maneuverable "ground effect machine," built by Dr. William R. Bertelsen, Neponset, Ill., in his spare time, has been selected by the Office of International Trade Affairs to be exhibited overseas. The doctor-inventor has demonstrated that "small shop amateurism" still has its place in industrial America.

The wheelless auto is supported by a jet of air directed downward along its periphery. Skimming 12 in. above the ground on its "cushion" of air, the 1700 lb Aeromobile 200-2 is capable of 60 mph and can climb short grades of 20 degrees.

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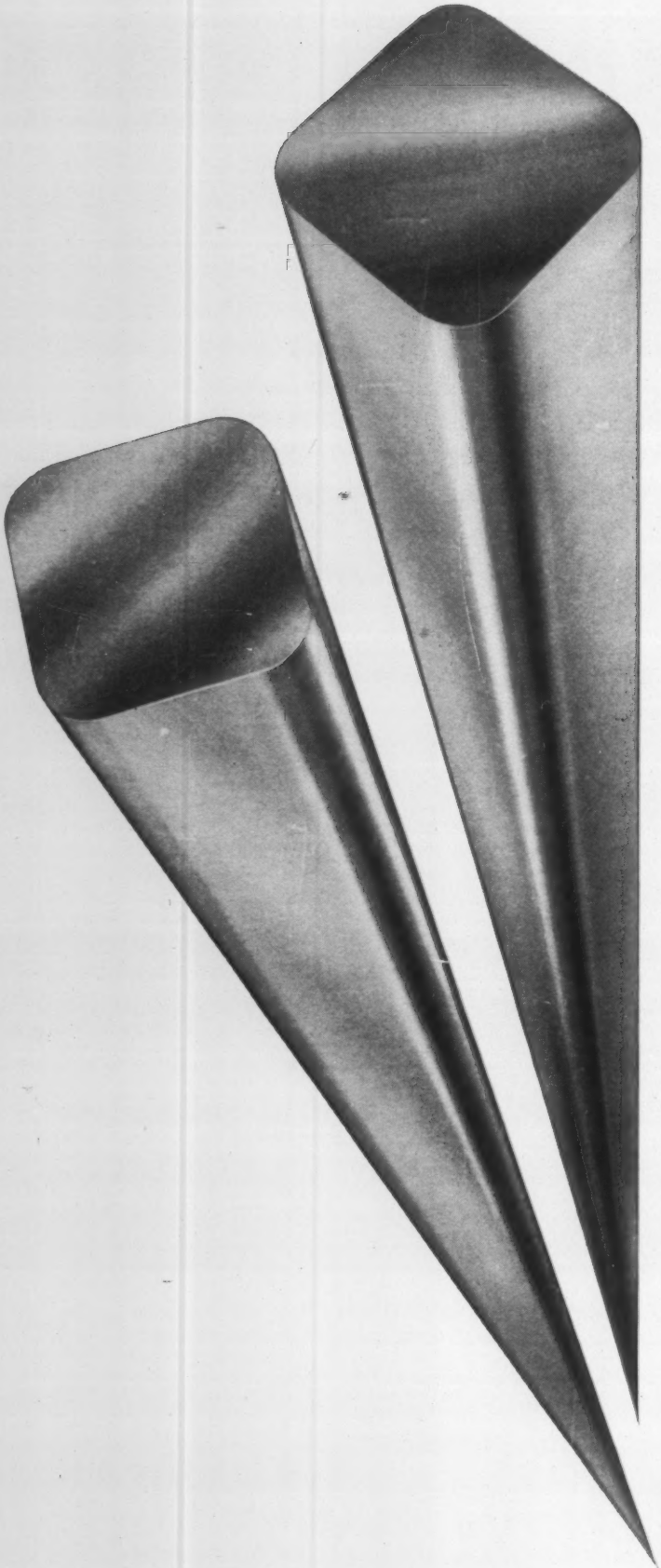

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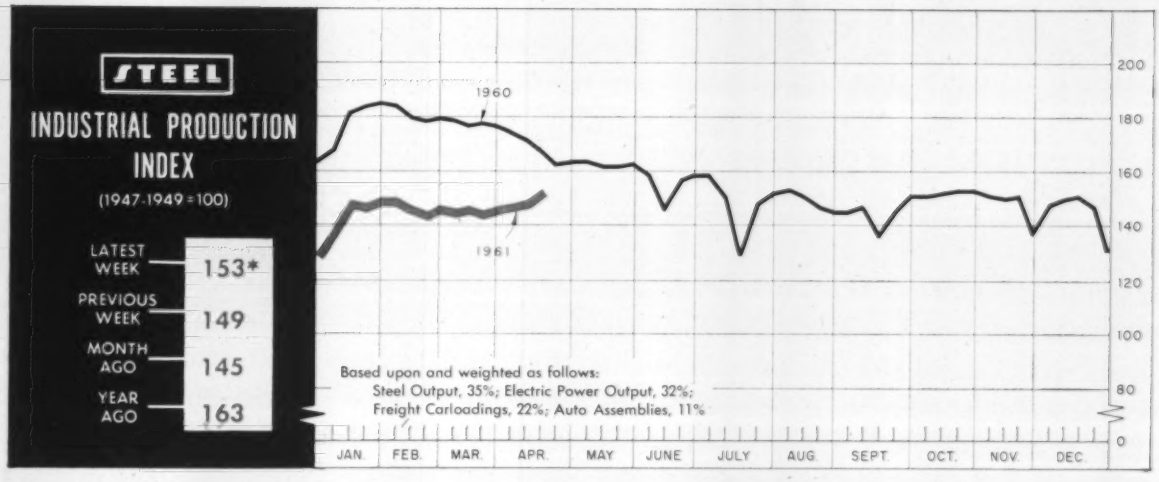

*Week ended Apr. 15.

Economists Betting on Fast Recovery

TWO QUESTIONS keep popping up whenever businessmen start talking about the recovery: 1. How fast is it going to be? Will durables keep pace, or will they lag the general upturn?

There are no pat answers to either question, but there are many who are willing to stake their reputations on a faster than expected recovery. And they are equally willing to bet that durables will improve, but at a slower pace.

• **Four Boosters**—At least four factors point to a fairly brisk recovery: 1. The recession bottomed out considerably ahead of most forecasts. 2. There has been almost daily improvement in the outlook. 3. The previous three postwar business cycles were noted for their fast rebounds. 4. There is extreme confidence in the business community.

• **Early Uptrend** — Until two or three weeks ago, almost any economist would have told you that the bottom of the cycle would be in the second quarter at the earliest. Statistics are beginning to confirm the current feeling that the bottom was hit as early as February. STEEL's industrial production index (above) has been practically level since the second week of February. The Federal Reserve Board's industrial production index also hit its low point (when carried out to the first decimal point) two months ago.

The chart on the following page indicates stability at 102 (1957 = 100) during the first quarter. However, there was almost enough improvement last month to round the reading off to 103. As small as the gain appears, it is significant that it came at a time when the experts felt the index would be moving into the trough.

• **Daily Improvement** — Hardly a day goes by but what some new pronouncement or statistic bolsters the outlook. For example, a few days back, five of Cleveland's bank

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,800[1]	1,748	2,238
Electric Power Distributed (million kw-hr)	14,150[1]	14,182	13,263
Bituminous Coal Output (1000 tons)	6,570[1]	6,560	8,382
Crude Oil Production (daily avg—1000 bbl)	7,200[1]	7,227	7,032
Construction Volume (*ENR*—millions)	$364.1	$440.0	$397.8
Auto, Truck Output—U. S., Canada (*Ward's*)	147,230[1]	126,099	169,663
TRADE			
Freight Carloadings (1000 cars)	525[1]	506	623
Intercity Truck Tonnage (changes from year ago)	−3.5%	−6.6%	−0.5%
Business Failures (Dun & Bradstreet)	343	350	333
Currency in Circulation (millions)[2]	$32,007	$31,898	$31,827
Dept. Store Sales (changes from year ago)[2]	−16%	+6%	+18%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$26,117	$26,109	$25,071
Federal Gross Debt (billions)	$288.6	$288.8	$286.5
Bond Volume, NYSE (millions)	$33.8	$35.1	$21.0
Stocks Sales, NYSE (thousands of shares)	25,670	28,988	10,451
Loans & Investments (billions, adjusted)[3]	$109.3	$108.7	$100.8
U. S. Govt. Obligations Held (billions)[3]	$29.7	$29.2	$24.4
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	214.9	214.1	230.7
All Commodities[6]	119.4	119.5	120.1
Commodities Other than Farm & Foods[6]	127.9	127.9	128.7

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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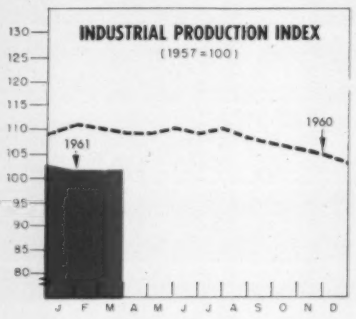
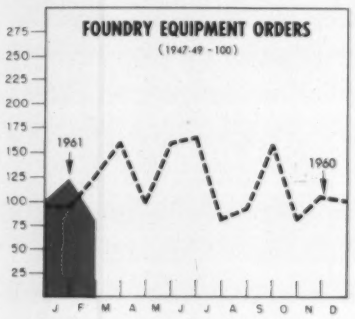
THE BUSINESS TREND





(Seasonally adjusted)

	Total Production		Total Mfg.		Durables Mfg.	
	1961	1960	1961	1960	1961	1960
Jan.	102	111	101	112	95	111
Feb.	102	110	101	110	94	109
Mar.	102*	109	102*	110	95*	108
Apr.	...	109	...	109	...	106
May	...	110	...	110	...	107
June	...	109	...	110	...	105
July	...	110	...	110	...	106
Aug.	...	108	...	108	...	104
Sept.	...	107	...	107	...	102
Oct.	...	106	...	106	...	101
Nov.	...	105	...	104	...	98
Dec.	...	103	...	103	...	96
Avg	...	108	...	108	...	104

Federal Reserve Board. *Preliminary.
Charts copyright, 1961, STEEL.

	1961	1960	1959
Jan.	123.7	95.5	127.4
Feb.	81.8	128.6	237.1
Mar.	....	159.9	166.6
Apr.	....	97.9	154.2
May	....	159.0	157.0
June	....	164.8	125.1
July	....	80.0	110.7
Aug.	....	92.4	134.1
Sept.	....	158.1	131.3
Oct.	....	81.7	140.8
Nov.	....	106.5	131.2
Dec.	....	101.2	95.9
Avg	....	118.8	142.6

Foundry Equipment Mfrs. Assn.

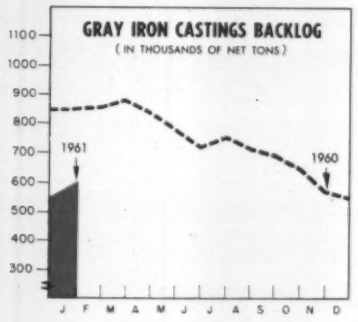
economists took their annual fling at forecasting business conditions a year hence for the Cleveland Society of Security Analysts. (See STEEL, Apr. 17, p. 20.) Every estimate for gross national product, industrial production, steel output, and auto production exceeded the median estimate of STEEL's Panel of Economic Consultants reported on pp. 41, 42 of the Apr. 3 issue. Significance: Two of the bankers are members of the panel and admit that they are much more optimistic now than three weeks ago.

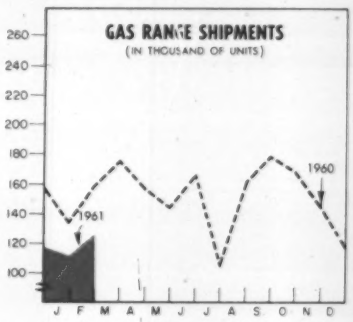
STEEL's production index also gives evidence of steady improvement. It has gained for four consecutive weeks, reaching the year's highest point (153 per cent of the 1947-49 average) during the week ended Apr. 15. The advance can be credited to strength in steelmaking, auto production, and a seasonal rise in railroad freight carloadings. Output of electric power is in a seasonal downturn.

• **It Happened Before** — James Dawson, vice president and economist for Cleveland's National City Bank, told the security analysts that GNP in the first quarter of 1962 would be at an annual rate of $540 billion, an 8 per cent gain from the trough. His was the highest estimate of the five. Yet, he declares that on the basis of past recoveries, the gain should be about 9 per cent from the trough. (The other four estimates ran from $530 billion to $534 billion.)

• **Buyers Confident** — Purchasing agents have been hinting for a month or two that better things are in the offing. In the latest reports, there is no hiding their confidence, based mainly on concrete gains within their companies. Members of the National Association of Purchasing Agents reported that March new orders improved over February's (32 per cent said so vs. 25 per cent the month earlier); 29 per cent said production advanced against only 24 per cent in February. In both cases, it was the first time since October that reports of improvement overbalanced reports of decline. Also, this was the first report to show any improvement in employment since July, 1960.

Members of the Purchasing Agents Association of Chicago reported an improvement in inventories in March. Forty-five per cent more respondents reported higher stocks than in the February period, while 23 per cent fewer reported





	Shipments 1961	Shipments 1960	Unfilled Orders* 1961	Unfilled Orders* 1960
Jan.	760	1,136	600	851
Feb.	1,108			855
Mar.	1,143			880
Apr.	1,051			834
May	1,053			782
June	1,050			720
July	803			755
Aug.	859			713
Sept.	900			695
Oct.	905			647
Nov.	836			569
Dec.	749			553
Total	11,593			

*For sale. U. S. Bureau of the Census.

	Shipments—Units 1961	1960	1959
Jan.	115,200	133,500	148,700
Feb.	124,800*	159,500	152,400
Mar.		175,000	171,300
Apr.		156,600	165,800
May		145,600	160,400
June		166,800	171,000
July		105,900	143,800
Aug.		162,800	176,400
Sept.		178,700	210,500
Oct.		169,300	195,000
Nov.		144,500	159,900
Dec.		117,900	157,100
Totals		1,816,100	2,012,300

*Preliminary.
Gas Appliance Mfrs. Assn.

lower stocks. The buyers also reported that business volume increased each month — February through April—compared with the fourth quarter.

• **From Whence Cometh?**—On the other hand, there are some arguments favoring a slow recovery. First, many businessmen ask: What will give the economy major impetus? They see no excessively strong forces at work now, or the near future. The usual answer: Help will come from a little of everything—stronger consumer activity, heavier construction, an upturn in capital spending in the second half, more auto production late in the year, increased government spending, a strong push up for inventories, a little inflation.

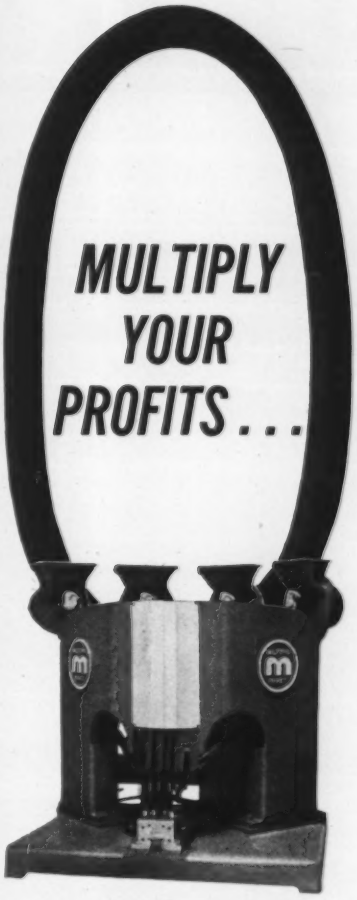
Second, there is some validity to the argument that a slow downturn may well result in a slow upturn because there is no excessive cutback to correct as in the past.

Third, some businessmen contend that the last three or four quarters have not been a recession in the sense we have come to accept the word, but merely an interruption of the 1958-59 recovery. As such, much of the upward momentum has already been spent.

Finally, the continuation of high unemployment argues against a sharp recovery similar to that in 1958-59. Now pegged at a seasonally adjusted 6.9 per cent of the work force, unemployment is likely to remain above 5 per cent well into 1962.

• **Slow in Durables**—Durable goods output it almost sure to share in this recovery—many feel it can't go much lower than it has been in the last two or three quarters unless a full fledged depression occurs. But STEEL's Panel of Economic Consultants and the Cleveland bank economists agree that the gains will not be as great as those in the general economy. For instance, they see no great upsurge in capital goods because capacity is generally ample, and replacement and modernization are slow processes. In addition, nondurable goods and services are competing more than ever for the consumers' dollar, partly because of the accent on youth and old age in the population mix and partly because the pent up desires of the post-World War II and post-Korean eras are satisfied.

For the economic views of a government economist, see Page 99.



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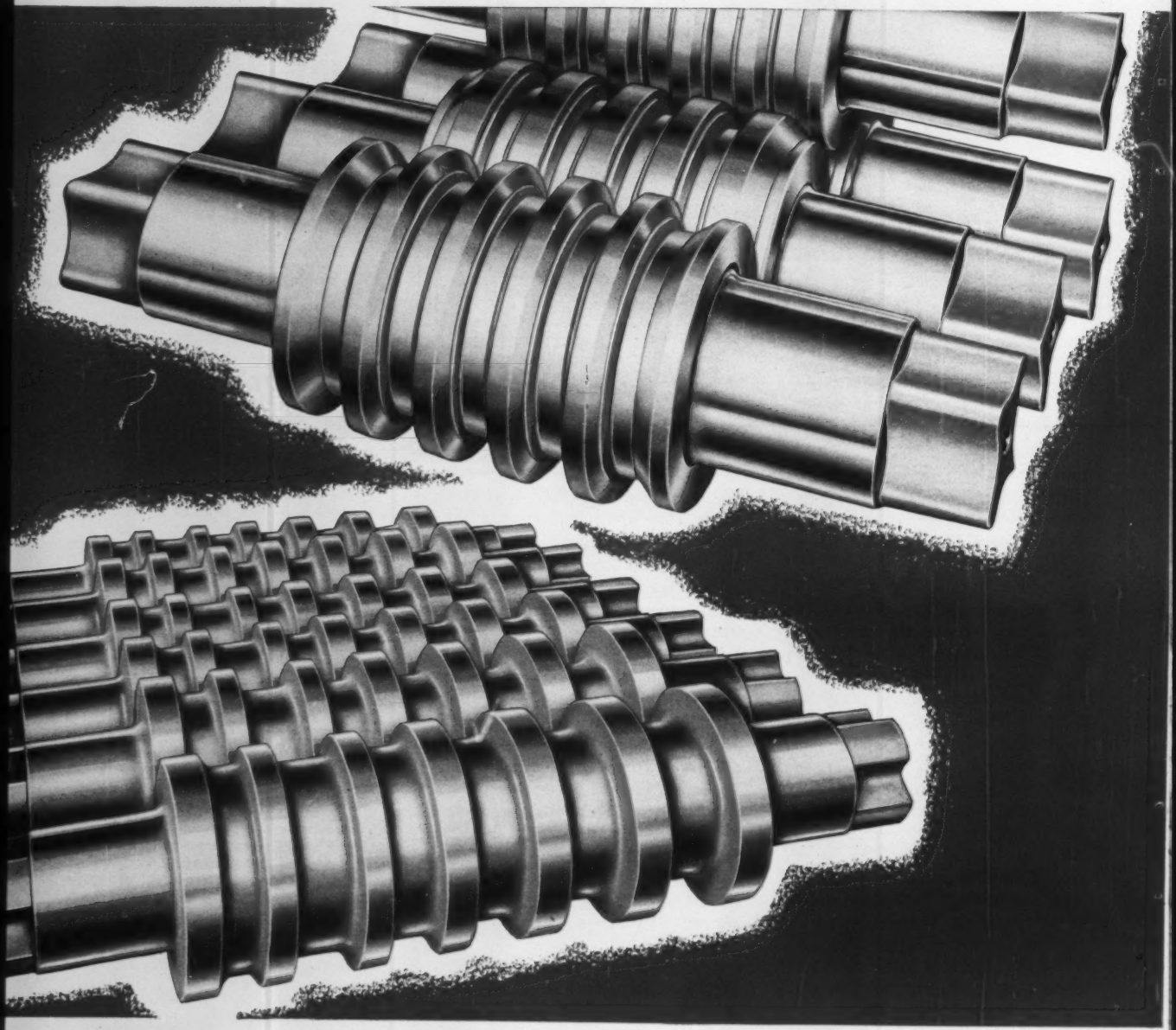

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OR-49

E. L. TABAT
Rockwell div. marketing

VINCENT W. STEHLIN
LeBlond purchasing agent

DONALD C. OSBORNE
Armco-Middletown Wks. post

CHARLES E. SMITH
Tubular Rivet v. p.

E. L. Tabat was named vice president-marketing, Power Tool Div., **Rockwell Mfg. Co.**, Pittsburgh. He is responsible for the combined marketing of Delta and Porter-Cable. **J. J. Diamond** was made Eastern sales manager; **B. E. Coon** Western sales manager.

S. Donald Sanders was named manager, Cleveland Works, **National Malleable & Steel Castings Co.**, replacing **John F. Torley**, resigned.

Robert E. Hater was named sales manager, **Willard Bronze Co.**, Cincinnati.

Arthur Sternberg was made vice president-general manager, Electrical Div., **Fairbanks, Morse & Co.** at Freeport, Ill. He succeeds **George H. Herrick**, who heads divisional headquarters sales of large electrical machinery at Beloit, Wis.

L. K. Shepard was made vice president-sales, **Standard Tool & Mfg. Co.**, Lyndhurst, N. J.

Vincent W. Stehlin was named purchasing agent, **R. K. LeBlond Machine Tool Co.**, Cincinnati. He succeeds **William McK. Reis**, retired. Mr. Stehlin was assistant purchasing agent.

Donald C. Osborne succeeds **Ora E. Clark**, who retires June 1 as general superintendent of **Armco Steel Corp.'s** Middletown, Ohio, Works. **John J. Timberlake** succeeds Mr. Osborne as assistant general superintendent of maintenance and services and is in turn replaced by **James G. Townsley** as superintendent of assigned maintenance.

Robert A. Gopel was made director of marketing plans of **Westinghouse Air Brake Co.**, Pittsburgh.

Richard Follansbee joined **Luria Bros. & Co. Inc.**, New York, as manager of industrial sales, Non Ferrous Div. He is in the Pittsburgh office. He formerly headed his own firm which specialized in nonferrous metals.

Charles E. Smith was elected vice president - production at **Tubular Rivet & Stud Co.**, Quincy, Mass. He was production manager.

Leland W. Ruffner, formerly with Stewart-Warner Corp., was made manager of engineering and research for **Warner Electric Brake & Clutch Co.**, Beloit, Wis.

Ralph C. Read was elected president, **Cenco Instruments Corp.**, Chicago, to succeed **Alfred A. Strelsin**, recently made chairman and chief executive officer.

Dr. Kenneth W. Newman fills the new post of director of sales engineering at **Nuclear Corp. of America**, New York. He was general manager of the Isotopes Specialties Co., a division at Burbank, Calif.

John W. Collins was named president, **Grove Valve & Regulator Co.**, Oakland, Calif., subsidiary of Walworth Co. He was senior vice

ARTHUR STERNBERG
heads Fairbanks div.

L. K. SHEPARD
Standard Tool v. p.-sales

RICHARD FOLLANSBEE
joins Luria Bros.

JOHN W. COLLINS
Grove Valve president

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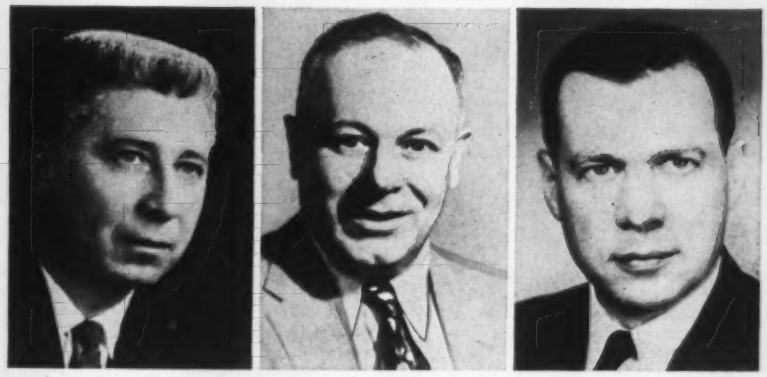

FRANKLIN MEYER JR. KENNETH H. WILLIAMSON JOHN G. ZEIGER

Taft-Peirce appoints vice president

president and chief executive officer.

Taft-Peirce Mfg. Co., Woonsocket, R. I., elected three vice presidents: **Franklin Meyer Jr.**, engineering; **Kenneth H. Williamson**, manufacturing; **John G. Zeiger**, marketing. **Dr. Walter M. Saunders Jr.** was made metallurgical director.

Micromatic Hone Corp. appointed **Joseph L. Pulliam** to the new post of sales manager, Micro-Precision Div., Los Angeles. He is succeeded as sales manager of the company's Microhoning products by **Thomas J. Chadwell.**

Arthur B. Allison was named president, **Howe Precision Products Co.**, Royersford, Pa., division of Howe Sound Co.

Toledo Scale Corp., Toledo, Ohio, appointed **Robert E. Bell** vice president-engineering for its Toledo Scale Div.; and **Robert O. Bradley** vice president-engineering for its Haughton Elevator Div.; both are in Toledo. They were chief engineers of their divisions.

D. J. Bastian fills the new post of general manufacturing manager, Automotive Assembly Div., Allen Park, Mich., **Ford Motor Co.** He was plant operations manager.

Dr. Robert Clark joined **National Forge Co.**, Irvine, Pa., as manager of process metallurgy. He was chief research metallurgist at Atlas Steels Ltd., Welland, Ont.

Peter S. Blake was named director of manufacturing, Automotive & Railway Products, **A. O. Smith Corp.**, Milwaukee, a new post. He was director of administration, Automotive Div.

Champion Rivet Co., Cleveland, appointed **E. J. Markert** vice president-manufacturing; **William F. Dempsey** manager, Forging Div.; and **Donald J. Schaefer** manager, Welding Div.

Alexander E. Lawson Jr. was made vice president of **Gow-Mac Instrument Co.**, Madison, N. J. He was chief engineer, Fenwal Electronics Inc., Framingham, Mass., and general manager of Davis Instruments, Newark, N. J.

National Tube Div., Pittsburgh, U. S. Steel Corp., appointed **Paul C. Ely** general manager-operations, a new post, responsible for manufacturing at National Tube's six plants. **Ralph M. Overton**, assistant vice president-operations, has retired. **Walter P. Rhodes** was made general manager-marketing, also a new post. **William C. French Jr.** succeeds **Louis W. Mason**, retired, as general manager-sales. He was Eastern area sales manager. **James G. Morrison** was named sales manager, New York district office.

R. L. Boyer, vice president and director of engineering, **Cooper-Bessemer Corp.**, Mt. Vernon, Ohio, was promoted to vice president-advanced planning. **D. L. Gallogly**, chief engineer, succeeds Mr. Boyer as operating head of the Engineering Dept.

W. S. Tyler Co., Cleveland, appointed **Walter J. Parks** director of product development, Screening Div.; **Edgar E. Gardner** chief engineer, Screening Machinery Div.

Delco-Remy Div., Anderson, Ind., General Motors Corp., appointed **E. A. Black** manager of purchasing; **Claude R. Moneyhun** manager of value analysis; **George T. Hitz** to succeed Mr. Moneyhun as purchasing agent, Anderson plants.

Henry J. Pannell Jr. was promoted to sales manager, **Kin Tel Div.**, San Diego, Calif., Cohu Electronics Inc.

Rudolph V. Nadeau was named sales and office manager for **Briston Instrument Gears Inc.**, Forestville, Conn.

George Konkol was made general manager, Microwave device operations, for **Sylvania Electric Products Inc.**, subsidiary of General Telephone & Electronics Corp. He is located at Mountain View, Calif. He was general manufacturing manager, Parts Div., Warren, Pa.,

PAUL C. ELY WALTER P. RHODES WILLIAM C. FRENCH JR.

National Tube executive appointments

E. W. WAGNER
Sidney Machine Tool v. p.

C. GLEN BIGELOW JR.
Selas v. p.-research

RICHARD H. PURSELL
Electric Products sales

JAMES B. CARSE
Clayton Mark gen. sales mgr.

A. CLARK DAUGHERTY
Republic Flow Meters v. p.

ANWAR A. ATALLA
Torrington div. post

EDWARD F. CANNON
Boston Gear works mgr.

JOHN J. O'CONNOR
J&L gen. mgr. post

QUENTON N. GROTH
president of Eaton Ejes

and succeeds **Meyer Leifer**, resigned.

Boston Gear Works Div., Quincy, Mass., Murray Co. of Texas Inc., appointed **Edward F. Cannon** works manager. He is replaced as general superintendent, Quincy plant, by **Alec D. Shaw**, who served for the last two years as general manager, Compressed Steel Shafting Co., subsidiary of Murray.

John J. O'Connor was made general manager for production planning and sales service, Stainless & Strip Div., Detroit, **Jones & Laughlin Steel Corp.** He was division manager of production planning.

Quenton N. Groth was appointed president-general manager of **Eaton Mfg. Co.'s** Argentine subsidiary, Eaton Ejes S.A.I.C.

E. W. Wagner was named vice president-general manager, **Sidney Machine Tool Co.**, Sidney, Ohio, subsidiary of Buhr Machine Tool Co. He was general sales manager.

C. Glen Bigelow Jr. was elected vice president-research, **Selas Corp. of America**, Dresher, Pa. He was director of research.

Richard H. Pursell was made general sales manager for **Electric Products Co.**, Cleveland.

James B. Carse, former market development director for Rust-Oleum Corp., was named general sales manager at **Clayton Mark & Co.**, Evanston, Ill.

A. Clark Daugherty was appointed vice president of **Republic Flow Meters Co.**, Chicago, subsidiary of Rockwell Mfg. Co. He was executive assistant to the president, and is also vice president of Republic Flow Meters Canada Ltd. **Orval W. Riggs** was made manager of instrument and control product sales and product sales for the Canadian firm.

Anwar A. Atalla was made engineering manager, **Connecticut Air Moving Div.**, Torrington Mfg. Co., Torrington, Conn.

Frederick P. Salzman was made executive assistant to the general manager of **Cleveland Graphite Bronze Div.**, Clevite Corp., Cleveland. Former works manager, his new post involves over-all planning and execution of division activities.

Maxwell M. Wachowiak was made manager, Motor State Products Div., Detroit, **Dura Corp.**

OBITUARIES...

Clarence L. Holmberg, director of administration, **Inland Steel Co.**, Chicago, died Apr. 15.

George Walther, 85, president, **Dayton Steel Foundry Co.**, Dayton, Ohio, died Apr. 10.

Frank S. Carlile, 72, cofounder of **C&D Batteries Div.**, Conshohocken, Pa., Electric Autolite Co., died Mar. 30.

Daniel A. Friedman, 37, president, **Solar Steel Corp.**, Cleveland, died Apr. 15.

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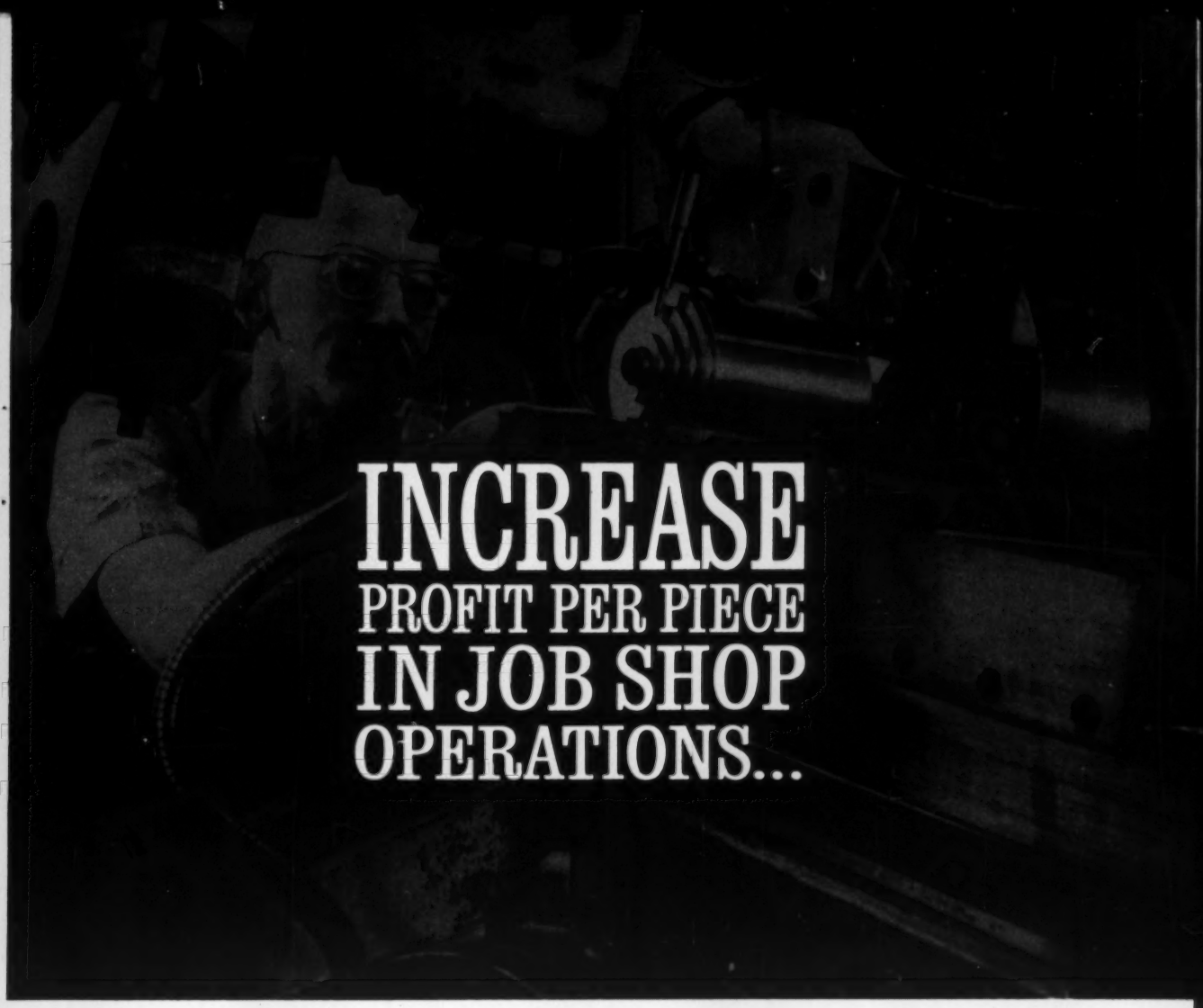

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Sharon Steel to Install Stora Kaldo Furnaces

SHARON STEEL CORP., Sharon, Pa., has launched two multimillion projects: Construction of the first Stora Kaldo basic oxygen steelmaking facility in the Western Hemisphere and installation of two new slab heating furnaces.

• **Stora Kaldo** — The two-furnace facility will tap 150 ton heats. Initial annual capacity will be about 1 million ingot tons of steel. Ultimate capacity (about 2 million tons) will be reached with the addition of a third furnace.

Sharon expects to tap the first heat in the fall of 1962. Dravo Corp., Pittsburgh, will design and build the $17.5 million plant at the Roemer Works, Farrell, Pa. National Cylinder Gas Div. of Chemetron Corp., Chicago, will build and operate an on-site air separation plant to supply high purity oxygen for the process.

Stora Kaldo facilities are in operation in Domnarvet, Sweden, and Seremange, France. Five other plants are being constructed in Sweden and England. The three big advantages of the process: Heat economy, temperature control, and metallic yield. "Stora Kaldo will provide in the finished product extremely close control of phosphorus, sulfur, nitrogen, oxygen, and nonmetallic inclusions," says James A. Roemer, chairman, Sharon Steel Corp.

The new melt shop will be housed in a building 500 ft long by 244 ft wide. The furnaces will be 25 ft long and 18 ft in diameter at the center. They will rotate in a cradle at speeds up to 27 rpm at an angle of 17 degrees. High purity oxygen will be injected into each vessel through a water cooled lance mounted in the movable exhaust hood—it will fit over the mouth of the furnace. Wet scrubbers in the dust collection system will closely control air pollution.

• **Heating Furnaces**—Contracts have been signed by Sharon Steel for the installation of two new slab heating furnaces. The $4.5 million modernization project has two aims: Improved temperature control and an increase in the maximum slab thickness used on the firm's 24 in., continuous hot strip mill. Design of the furnaces will permit simultaneous handling of slabs of different physical characteristics so that they can be fed to the rolling mill as required.

A new, 36 in. diameter vertical edger, driven by a 500 hp motor, will break scale and reduce slab width so that all slabs will be uniform prior to entering the roughing line. The modernization will also incorporate increased horsepower in the mill drives and relocation of the mill stands for more efficient operation.

Armco Orders Plate Mill

A combination slabbing and plate mill is being designed and will be manufactured by Mesta Machine Co., Pittsburgh, for installation at the Houston plant of Sheffield Div., Armco Steel Corp. The mill will operate alternately as a 46 in. by 120 in., two high, reversing slabbing mill and as a 160 in., four high, reversing plate mill. As a slabbing mill, the installation will roll steel ingots weighing up to 70,000 lb into slabs 3.5 to 14 in. thick and 30 to 68 in. wide. As a plate mill, it will roll steel slabs into plates 0.180 to 3 in. thick and 50 to 155 in. wide.

Installs Vacuum Furnace

Commercial Metal Treating Inc., Bridgeport, Conn., has installed automatic, vacuum heat treating and brazing equipment. The furnace has an effective work area 22 in. wide, 34 in. long, and 12 in. high. It is designed to maintain continuous operating temperatures up to 2250° F at an ultimate pressure of 0.1 micron.

Vacuum processing makes it possible to harden and anneal stainless, high speed, and tool steels, and high temperature alloys without danger of surface contamination or discoloration. It can also be used for sintering and brazing of high temperature alloys.

Ford Sells Assembly Unit And Buys Two Part Plants

Ford Motor Co., Dearborn, Mich., sold its car plant at Chester, Pa., to Reynolds Metals Co. for $2.2 million. Reynolds will use the 650,000 sq ft facility for fabricating operations.

Ford Motor has purchased a battery plant at Owosso, Mich., and a sparkplug plant at Fostoria, Ohio, from Electric Autolite Co., Toledo, Ohio. Ford plans to continue production at both plants.

Electric Autolite will continue to manufacture and market sparkplugs, batteries, and other automotive products. Sparkplug manufacture will be continued at the plant of Electric Autolite's subsidiary at Sarnia, Ont., and at an additional assembly facility that will be built in the U. S. Automotive battery manufacture will be continued at various plants, including those at Vincennes, Ind.; Reading, Pa.; Oakland, Calif.; Oklahoma City, Okla.; and Atlanta.

Electric Furnace to Make Spiegeleisen at Palmerton

New Jersey Zinc Co., New York, is constructing an electric furnace plant at Palmerton, Pa., for the production of spiegeleisen. The new application of electric smelting was developed to treat iron-manganese ores, particularly those from the firm's Sterling mine at Ogdensburg, N. J. Company officials say the installation will be more economical, more efficient, and of wider scope for making various ferrous alloys than the present blast furnaces which it will replace. The project is scheduled for completion in 1962.

Uranium Contract Signed

Western Gold & Uranium Inc., New York, has signed a contract under which all the uranium produced from its Orphan mine at

Grand Canyon, Ariz., to the end of 1966 will be sold to Rare Metals Corp. for processing in its mill at Tuba City, Ariz. Rare Metals is a subsidiary of El Paso Natural Gas Co. A carbonate leach circuit will be installed at the mill which will result in a saving of more than $3 a ton of ore milled compared with the acid extraction process.

Roanoke Licensed to Use B&W Steel Casting Process

Babcock & Wilcox Co., New York, has licensed Roanoke Electric Steel Corp., Roanoke, Va., to operate a continuous casting steel plant. The plant will be operated on an experimental basis under regular production and product application conditions. It is designed to cast 3 to 6 in. square bars. Completion of the facility is scheduled for the early part of 1962.

Foundry Will Be Replaced

Chicago Pneumatic Tool Co. will replace the foundry at its Franklin, Pa., plant. Installation of new equipment will be accomplished while continuing operations in the present foundry. An entirely mechanized molding unit, mechanized cupola charging equipment, and sand handling and conditioning equipment are planned. Cost: More than $1 million.

CF&I Boosts Plant's Power

Colorado Fuel & Iron Corp., Denver, has installed the last leg of a 69,000 volt, electric transmission line as part of a $2.2 million electrical facilities expansion program at its Pueblo, Colo., plant. The new loop will carry power to all departments in the mill, including the oxygen steelmaking plant which is being constructed.

Universal Broadens Line

Universal Vise & Tool Co., Parma, Mich., acquired the standard pump jig and fixture lock product line of Swartz Tool Products Co., Detroit. Swartz Tool will continue to manufacture special tooling and fixturing in Detroit. Universal Vise has organized the Swartz Standard Fixture Div. to make and market the new line.

CONSOLIDATIONS

Eastern Co., Naugatuck, Conn., acquired **Wilfrid O. White Co.**, Boston, manufacturer of boat compasses, depth sounders, automatic pilots, and weather instruments. The property will be combined with the Danforth Anchor Div., Portland, Maine, to form the Danforth-White Div.

Dynamic Gear Co. Inc., Amityville, N. Y., purchased **Gear Products & Mfg. Co.**, Syosset, N. Y.

Olin, (formerly **Olin Mathieson Chemical Corp.**), New York, bought **Cooey Firearms Co.**, Cobourg, Ont., producer of rifles and shotguns. A separate operation, Winchester-Western Ltd. of Canada will distribute a noncompetitive line of Winchester firearms manufactured in the U. S.

Vinnell Steel, Irwindale, Calif., a subsidiary of Vinnell Corp., Alhambra, Calif., purchased **Independent Iron Works Inc.**, Oakland, Calif. Combined monthly capacity of the Irwindale and Oakland plants exceeds 5000 tons of structural steel, bridge girders, steel storage tanks, metal structures for service stations, penstocks, and similar products. R. W. Cutler is vice president and general manager of the Vinnell Steel operation.

Eaton Mfg. Co., Cleveland, acquired substantially all the assets of **Dill Mfg. Co.**, Cleveland, producer of tire valves, valve parts, accessories, and related equipment; and tire and tube repair equipment and materials. Dill will be operated as a subsidiary of Eaton.

American Pipe & Construction Co., Monterey Park, Calif., purchased **Planett Mfg. Co.**, Downey, Calif., and will operate the property as a division of Etiwanda Steel Products Inc., a subsidiary of American Pipe. Planett is a manufacturer of welded steel wire mesh.

Bostitch Inc., East Greenwich, R. I., purchased **Calwire Products Inc.** and **Calbail Inc.** (its selling organization), Visalia, Calif. Calwire produces heavy duty stapling and nailing equipment.

Adolph Plating Inc. acquired **Electro Galvanizing Co.** and **United Plating Corp.** All are in Chicago.

ASSOCIATIONS

American Hot Dip Galvanizers Association, Washington, elected these officers: President, W. M. Boyles, Boyles Galvanizing & Plating Co., Hurst, Tex.; first vice president, T. R. Gregory, Thomas Gregory Galvanizing Works, Maspeth, N. Y.; second vice president, Cooper Hawthorne, Metal Services Inc., Port Neches, Tex.; secretary-treasurer, C. E. Perry. John R. Daesen is technical director.

American Zinc Institute, New York, and **American Hot Dip Galvanizing Association**, Washington, have launched a joint research and development campaign to expand the uses of hot dip galvanizing.

Steel Marking Tool Institute has been organized by firms specializing in the design and manufacture of steel marking tools, dies, and related equipment. It has been formed within the framework of the **Marking Device Association**, Chicago. Officers of the new group include: President, Eric Novak, Cadillac Stamp Co., Detroit; vice president, Douglas Forrester, Acme Marking Equipment Co., Detroit; treasurer, James Snaman, Pannier Corp., Pittsburgh; and secretary, T. H. Brinkman, Marking Device Association.

NEW ADDRESSES

H. K. Porter Company Inc., Pittsburgh, moved the Detroit sales office of its **Riverside-Alloy Metal Div.**, Riverside, N. J., to 50 W. McNichols Rd., Detroit 3, Mich. Joseph Rey heads the sales office.

Phoenix Steel Corp., New York, moved its New York sales office to Bergen Mall, Gallery Offices, Paramus, N. J. Norman Kelsey is the New York district sales manager.

LOOKING FOR HIGHER EFFICIENCY AND LONGER LIFE IN RIGHT ANGLE DRIVES?

Then take a closer look at Philadelphia Spiral Bevel Reducers. They'll give you an efficiency advantage of 5 to 50% over other types of right angle drives . . . depending upon ratios.

HIGH EFFICIENCY. With efficiencies of 95 to 98%, spiral bevel reducers will lower your power costs . . . reduce the cost of prime movers.

HEAVY DUTY. The bearings and shafting in Philadelphia Spiral Bevel Reducers are designed for 185% overload. Spiral Bevel Gears and Pinions are hardened after they are cut, then lapped to a mirror finish. Helical gearing in multiple reduction units is precision hobbed and shaved from through-hardened alloy steel. Result: greater load carrying capacity, longer life.

COOLER RUNNING. Compared to other types of right angle drives, Philadelphia Spiral Bevel Reducers run cooler. Separate cooling systems are not needed for most applications.

COMPLETE LINE. Philadelphia Gear offers the most comprehensive line of Spiral Bevel Reducers available — or we can build specially engineered units to meet any special requirement. Ratios from 1:1 to 238:1. Single, double or triple reductions in either vertical or horizontal types. Catalog SB-60 gives full selection data. Write on your company letterhead for your copy.

philadelphia gear drives

PHILADELPHIA GEAR CORPORATION
King of Prussia (Suburban Philadelphia), Pennsylvania

Technical Outlook

Rx FOR BETTER METALS— High voltage particle accelerators and x-ray generators offer a possible means of creating entirely new metals, states E. Alfred Burrill, vice president, High Voltage Engineering Corp., Burlington, Mass. Deep probing with such energies produces ions. When they recombine, such ions can enhance or degrade the parent material, he states.

PROBES MOLTEN METALS— A fluorescent, x-ray spectrograph developed by the U. S. Bureau of Mines can study the surface chemistry of molten metals as they oxidize at 1650° F, declares the Department of the Interior. It is hailed as a major step toward equipment which could make similar studies on molten metals and fused salts at 2550° F.

DUCTILE BERYLLIUM— The Franklin Institute, Philadelphia, claims it has produced beryllium that is 50 times more ductile than that which can be produced currently. The approach: Ultrahigh purity made possible by floating zone refinement.

STAINLESS CLAD ALUMINUM— A method of molecular bonding has made possible limited production of stainless clad aluminum sheets, states Fairmont Aluminum Co., Fairmont, W. Va., a subsidiary of Cerro Corp. The firm says any size or gage can be produced. First products may possibly be utensils, the firm states.

PURE TELLURIUM— Penn Rare Metals Inc., Revere, Pa., claims it is producing tellurium that is 99.9999 per cent pure.

FLURRY OF PIPELINE WELDERS— The welding of pipe with portable, automatic units is fast becoming commonplace. Air Reduction Sales Co., a division of Air Reduction Co., New York, introduced its version last week as part of the welding show. Linde Co., a division of Union Carbide Corp., New York, is about ready to announce versions which can handle sizes from 6 to 36 in. Aluminium Ltd., Montreal, Que., has such units already operating on aluminum pipeline construction, is about to announce one which can handle pipes 2 or 3 in. in diameter.

STRONGER PYROLYTIC MATERIAL— Reductions in size and weight of components made of pyrolytic materials are possible with Boron Pyralloy because of its strength, says High Temperature Materials Inc., Boston. Room temperature bend strength is 37,000 psi.

UPGRADE WITH SILVER— Several alloys of aluminum, zinc, magnesium, and copper may be improved by adding 0.3 per cent silver (weight), says I. J. Polmear, Australian Defence Scientific Service, Department of Supply, Melbourne, Australia. He notes a considerable degree of hardening at high aging temperatures, a significant increase to stress corrosion, and minor improvements in fatigue and high temperature performance.

ACCURATE BRAZING— A Detroit firm brazes 63 stainless blades in a 10 in. rotor for a missile motor yet succeeds in holding tolerances to 0.002 in., says Wall Colmonoy Corp., Detroit. A controlled atmosphere furnace is employed.

SELF-SEALING COMPOSITES— Eying future space cabins, lunar vehicles, and similar applications, Northrop Aircraft Corp., Hawthorne, Calif., has developed and proved self-sealing honeycomb panels.

PINPOINT ALUMINUM FATIGUE— Tests with Dural type alloys have shown a definite decrease in fatigue life accompanies exposure to humid air compared with dry air. The researchers, Drs. Trevor Broom and Anthony Nicholson, formerly of the University of Birmingham, England, believe the phenomenon involves the production of hydrogen ions at clean surfaces exposed by slip and subsequent diffusion into the metal. A suggested solution: A moisture barrier (Butyl rubber, for example).

Corrugated foil cut to size . . .

and glued to stator iron . . .

Stainless Foils Corrosion

• CORROSION RESISTANCE of stainless steel and the electrical insulating properties of a plastic were combined at a saving in cost in a new method of protecting electric motors for severe service. Stainless foil, used as a mold for an epoxy resin, stays in place and adds corrosion resistance to the assembly.

Not only does the combination resist tougher conditions than the resin alone; it also offers a decrease in cost over the standard encapsulated motor, says the manufacturer, Epoxylite Corp., El Monte, Calif.

The method is adaptable to a wide range of motor sizes. It eliminates the need for permanent molds for curing the plastic.

• Encapsulation, or "potting," protects electrical components from moisture, airborne dust, fungus attack, and vibration.

It has been used in the electronics field. Subassemblies, or complete units, are placed in a mold. A liquid resin is poured into the mold and cured. The potted units are thus protected from any attacking substance which cannot penetrate the plastic.

Some years ago, the company had solved the problems connected with producing an encapsulated motor, using an epoxy resin. While it withstood more severe service than an untreated motor, it had several disadvantages:

• Tooling costs were high; permanent molds were needed.

• The production cycle was slow (up to 8 hours per operation); and removal from the mold was troublesome.

serves as mold for epoxy resin, since . . .

• Too much resin was often needed because the cost of molds precluded a new mold for each size and design of motor.

• Epoxy resins, as modified for potting work, failed when they were exposed to some common corrosive environments.

The new method helps in all of those areas.

• Stainless foil serves as the mold in the new process.

The nonmagnetic foil is 0.002 in. thick. It is formed to the shape needed, and joints are sealed with a special epoxy resin chosen for its resistance to chemicals.

Long corrugated strips of foil, overlapped to form circles, are trimmed to the size of the motor and sealed to the stator iron at the ends with an epoxy paste adhesive. An additional strip of the thin foil can be glued to the stator core for greater protection.

A rubber bladder, inserted in the core of the motor, is inflated to provide support for the foil against the hydrostatic head of the resin. Then the liquid epoxy resin is poured in through a simple spout. Curing to a solid takes about 45 minutes. At the end of the period, the bladder can be removed.

• The foil remains with the motor, giving additional protection.

In effect, the motor functions as a "canned" unit; the stainless extends over the windings and through the motor bore. The stainless layer is thick enough to give considerable protection and is supported by the plastic layer underneath. Should the foil surface be damaged, the layer of plastic underneath still gives protection equivalent to the earlier encapsulated motor.

The nonmagnetic steel does not interfere with the motor flux. And it is spaced from the windings by glass cloth and by the epoxy resin, both insulators. The company reports that the stainless sheath can be positioned to within a few thousandths of an inch of the current bearing copper without danger of a short circuit.

The adhesive qualities of the epoxy resin used assure bonding of the stainless foil.

• The process may have other applications.

The method can be used to give a product the corrosion resisting properties of stainless. And there can be relative freedom of design for the envelope, coupled with ease of design changes since no permanent molds are needed.

The process is applicable to low production jobs because of the simplicity of the equipment involved. With more sophisticated tooling, it can be used for high production runs, the company states.

No heat is needed, and the liquids involved are easy to handle.

Some limitations are cited.

With present methods of application, there is considerable wrinkling of the stainless foil. As a result, the appearance of the foil is changed, and there is none of the luster characteristic of stainless.

The foil offers only corrosion resistance; it is not thick enough to give the strength and toughness associated with solid metal, or with heavy sheets. Although it withstands some abrasion and impact, it can be torn so that the resin support is exposed.

Epoxylite also points out: With some designs, there is no room for the combined protection system.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Grinding Experts Challenge Tradition

They intend to make "abrasive machining" a contender in heavy metal removal. To do it, they are disproving a couple of common notions—including the one that grinding is only for producing fine finishes and close tolerances

• **WOULD you consider grinding a part to remove ¼ in. of stock?**

Several abrasive experts say you'd be ignoring a possible cost reduction and time saving unless you tried grinding on the job.

They emphasize that the grinding wheel should be considered an "abrasive machining" tool, not merely a device for removing 0.010 in. or so to provide fine finish and close tolerances.

For example, two engineers at Norton Co., Worcester, Mass., have studied jobs in their plant. The engineers, Leo P. Tarasov and Richard H. Merritt, say that in one case: "A repetitive job formerly done by flat milling was changed to a heavy duty surface grinder. Cost of the operation was found to be just half that of the previous method. A standard "rule of thumb" that removal of a quarter of an inch of stock automatically meant a milling operation had for years prevented the use of a more economical machining method."

Norton has launched a research project to put abrasive machining in its proper place among the metal removal techniques (STEEL, Mar. 20, p. 102).

• **The concept of abrasive machining is designed to extend the range of grinding.**

Norton's President Ralph Gow sums up this way: "Modern developments in both grinding wheels and machines indicate this is an excellent time to thoroughly examine abrasive machining as an economical method of reducing present high costs of manufacturing. Our preliminary work indicates that wider acceptance of the concept of grinding as abrasive machining will lead to substantially greater productivity."

Explaining the role of the grinding wheel for heavy stock removal, Messrs. Tarasov and Merritt told STEEL: "When you realize that an abrasive wheel consists of millions of small, sharp cutting edges which actually produce chips, the concept of heavier stock removal with abrasives is similar in principle to other conventional chip-making operations.

"The abrasive wheel, as applied to heavy stock removal, is actually a self-sharpening, throwaway type tool.

"It requires no expensive, time consuming sharpening. It is relatively inexpensive. Breakage of properly used wheels is rare."

• **Substitution of abrasive wheels for milling cutters on some jobs has already been proved economical.**

At the machine tool exposition in Chicago last September, salesmen for Mattison Machine Works, Rockford, Ill., told their customers and prospects: "High powered surface grinders . . . are taking over stock removal operations not too long ago reserved for cutter type machine tools."

To back up their contention, the salesmen could call on a host of job records in which Mattison had switched parts from cutter type machining to abrasive machining. Some samples: 1. Four, large, forging dieblocks were turned out on a planer per shift; on a 100 hp, vertical spindle, rotary surface grinder, seven blocks are completed in a shift. 2. Production men used to get five timing gear housings an hour on milling machines; they get 12 an hour on a rotary surface grinder. 3. It costs $19.87 to plane Meehanite hopper tables (including machining, tool, and nonproductive costs); it now costs only $4.94 to grind the ¼ in. on all four sides at a rate of 8.6 cu in. a minute.

• **Abrasive machining offers a potential gain in four cost areas.**

Mattison cites these as the factors most likely to put abrasives in the heavy metal removal race:

1. The cost of wheels can be lower than the cost of cutting tools. Wheels can be self-dressing—eliminating downtime for replacing them. You almost never have to shut down to replace a broken wheel; and with automatic sizing, compensation for wear is taken care of. Wheel inventory costs are low since you don't need to stock up to allow for broken wheels; you don't need duplicates in the crib and the sharpening department; and since tool geometry is less of a factor than it is with other methods, a limited number of wheels fills a variety of needs. Also, there is no sharpening cost—first dressing is done on the machine, and wheels can be self-sharpening after that.

2. Machine costs may be lower with abrasive machining. Stock removal rates on high powered surface grinders have been doubled and sometimes tripled, says Mattison, because horsepower has been boosted (as much as 300 per cent); both the bond and the abrasive grains in wheels have been improved; and machine rigidity and downfeed rates are substantially increased over what they were ten

Here are three jobs on which Mattison Machine Works, Rockford, Ill., ran cost comparisons on cutter type and abrasive machining:

How Abrasive Machining Measures Up

SAVED: $0.19 per piece

Meehanite rocker arms are ground, ten at a time, in 4¼ minutes. Total stock removal is 0.125 in. Production is 38 an hour; it used to be 20 on a lathe.

	Lathe	Grinder	Savings
Machining Cost per Piece	$0.18	$0.15	$0.03
Tool or Wheel Cost per Piece	0.08	0.02	0.06
Nonproductive Cost per Piece	0.19	0.09	0.10
Totals	**$0.45**	**$0.26**	**$0.19**

Flatness after turning: 0.001 in. total indicator reading.
Flatness after grinding: 0.0002 in. total indicator reading.

Finish after turning: 64 microinches rms.
Finish after grinding: 30 to 40 microinches rms.

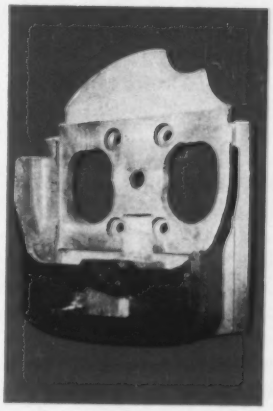
SAVED: $0.66 per piece

Forged steel chain links (34 on one table load) are completed at the rate of 81 an hour. By milling, production men used to get 16 an hour. Stock removal: 0.120 in.

	Milling Machine	Grinder	Savings
Machining Cost per Piece	$0.35	$0.06	$0.29
Tool or Wheel Cost per Piece	0.17	0.02	0.15
Nonproductive Cost per Piece	0.28	0.06	0.22
Totals	**$0.80**	**$0.14**	**$0.66**

Finish and Flatness Also Improved

SAVED: $9.83 per piece



Meehanite slide brackets are machined on a grinder (six pieces per load) at a rate of 1.6 an hour. A milling operation used to turn out 1.2 an hour. Stock removal is ¼ in. from each side.

	Milling Machine	Grinder	Savings
Machining Cost per Piece	$6.00	$4.50	$1.50
Tool or Wheel Replacement Cost per Piece	0.21	0.10	0.11
Nonproductive Cost per Piece	12.01	3.79	8.22
Totals	**$18.22**	**$8.39**	**$9.83**

Milling also required a $50 fixture. Accuracy was improved from ±0.005 in. to ±0.001. Both flatness and surface finish also improved.

Abrasive Machining Feed Rates

These are typical feed and wheel life rates taken from test jobs run at Mattison Machine Works:

Job #1 Type C Gunite Work Material

Total stock removal was 0.103 in. At a feed rate of 0.035 in. a minute, wheel wear ratio was 28 to 1 on a vertical rotary grinder. This was with a 30 grit, aluminum oxide wheel—G hardness, induced pour, vitrified bond.

Job #2 AISI 400 Series Stainless Steel Work Material

Total stock removal was 0.10 in. At a feed rate of 0.015 in. a minute, wheel wear ratio was 9.6 to 1. Stock removal rate was 2.36 cu in. a minute on a vertical rotary.

Job #3 SAE 121 Cast Steel Work Material

Total stock removal was 0.115 in. At a down feed of 0.060 in. a minute, wheel wear ratio was 15.4 to 1. Wheel was aluminum oxide, 30 grit, H hardness, vitrified bond.

years ago. Further, part handling and loading on magnetic chucks are fast and easy. Practically no clamping pressure is needed in most grinding fixtures; pot type fixtures will do for many jobs and the downward pressure of the wheel serves as a clamp. Thus, nonproductive time for loading, positioning, and unloading may be cropped.

3. Material costs can be cut since you don't need to pad stock allowances to "baby" the tool because of scale. Grinding wheels cut outer scale, grind through hard spots, and machine burned edges without trouble. Also, by removing a multiplicity of light chips, wheels can machine thin parts with a reduction in breakage or springing of the walls.

4. Fixture costs may be small, since little or no clamping pressure is needed; the magnetic table often handles many jobs. Thus you don't need a new fixture for each part, and new product leadtime may be slashed.

Advantages like those have already established abrasive machining for some operations. In making taps and drills, for example, it's common to grind the flutes to final dimensions and finish in a single pass from a solid piece of hardened steel. Sheffield Corp., Dayton, Ohio, showed two years ago that it could plunge grind the grooves in hard rod mill rolls in as little as 25 per cent of the time it took to cut them with single point tools (STEEL, Apr. 13, 1959, p. 122).

• The concept of abrasive machining is the result of new thinking on an old subject.

That's how Norton engineers Tarasov and Merritt look at it. They say new thinking will be required of many groups of industrialists. "Habit and tradition have had a strong influence in machine shops in the selection of machine tools to do certain operations. The alert machine shop superintendent will soon be asking himself: 'Is abrasive machining a better way of doing this job?' He may have to unlearn some of the 'facts' he has always known about the capabilities of grinding wheels."

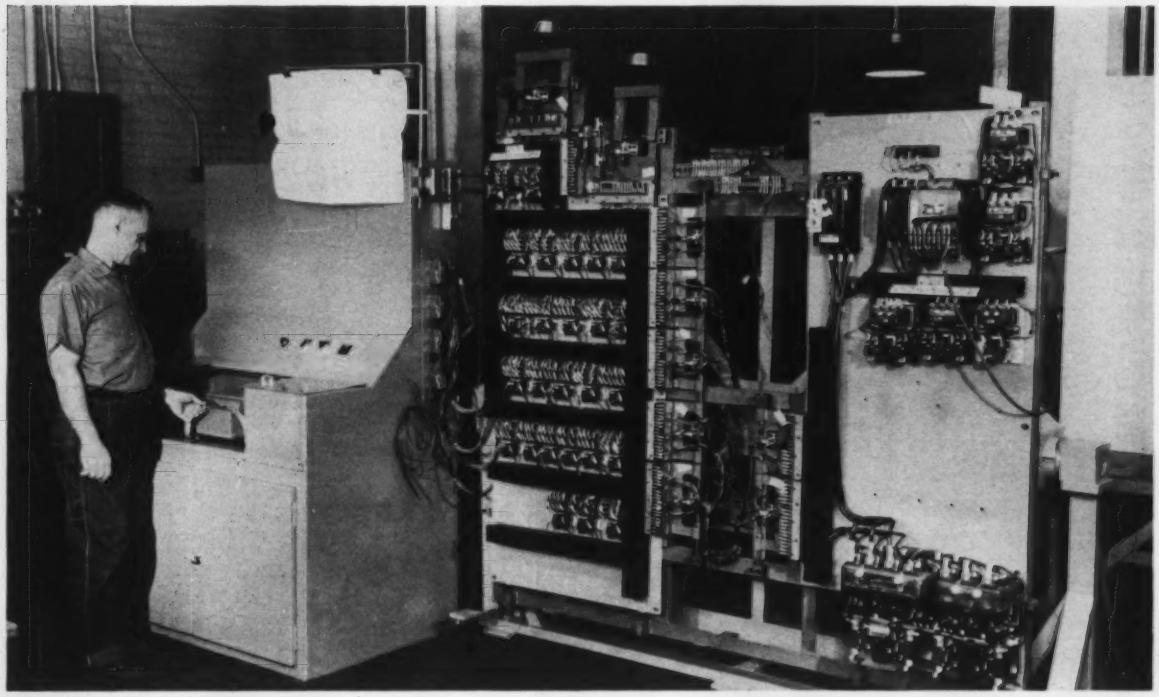
Messrs. Tarasov and Merritt also told STEEL that designers will need to know more about the grinding process. For example, elimination of inaccessible areas on a part may make it possible to process the whole part on a grinder. Further: "Designing castings and forgings with extra stock to allow for machining under the tough, outer scale is an expensive luxury which benefits only the scrap dealer." A minimum of extra stock will be needed if abrasive machining is to do the work.

Cost accountants are warned to avoid accounting procedures that may give a false picture of the cost of using abrasive wheels. Norton reports, for example, that the cost of abrasive wheels is often considered as a direct expense, while cutting tools are handled as overhead. That approach penalizes abrasives in favor of other types of machining.

Most important, process engineers (and all others who influence the way in which a part is made) should challenge preconceived notions as to the limitations of grinding. For example, it's a rule of thumb that an abrasive wheel requires at least 10 hp to remove a cubic inch of metal a minute—and that cutting type tools take about 1 hp per cubic inch a minute. Norton cites a test in which 100 hp on a grinder took off 35 cu in. of high strength cast iron a minute—about 3 hp per cubic inch a minute.

Mattison representatives agree on the importance of getting new information to the user. Metalworking managers must, in their opinion, become abrasive machining minded, must study competitive processes economically, must be aware that: "Modern surface grinders are designed to cut metal, not 'scratch' it."

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



Inspection is four times faster when . . .

Tape Control Checks Circuitry

• A TAPE controlled panel tester checks out circuitry in Warner & Swasey's machine control systems in one-fourth the time required by prior hand techniques. The tester can be adapted to different control systems by simply changing the tape.

The unit (installed at the firm's Cleveland plant) checks circuit continuity of a control panel and power panel on chucking automatics and a control panel and two power panels on a bar automatic. It checks coils of relays and starters, contacts (both normally open and normally closed); and it checks wire for breaks, for looseness of terminations, and for application to the proper terminals.

• Pretesting the panels before assembling them on the machine tool is necessary to avoid loss of time on the inspection floor.

Corrections and adjustments are easy to make before assembling the panel on the machine. Panels on five machines are inspected with the tape setup.

• The heart of the tester is a conventional Friden sequential tape reader.

Information from the tape is conveyed to groups of relays in the tester which energize and de-energize circuits of the panel being tested. The panel circuits then energize other groups of relays in the tester, indicating that circuits being tested are correct or not correct. If circuits are incorrect, the tape reader fails to advance the tape. That tells the inspector which part of the circuit is malfunctioning.

• The tape is a 1 in. wide, eight level, standard EIA type.

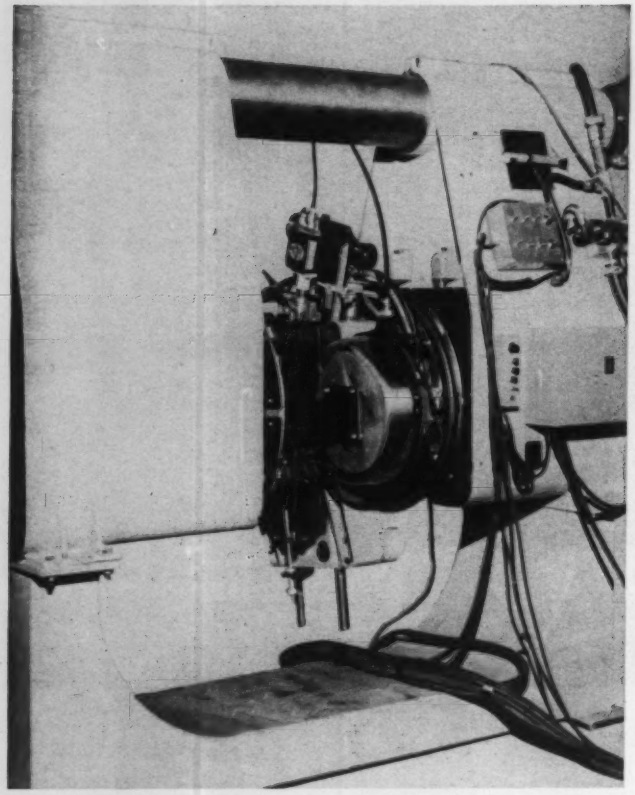
The tester relays simulate the machine's limit switches, and relays are selected by binary coded numbers put into the tape. The numbers pick out any one of 33 stepping switch positions and a level of one to eight in any of those positions.

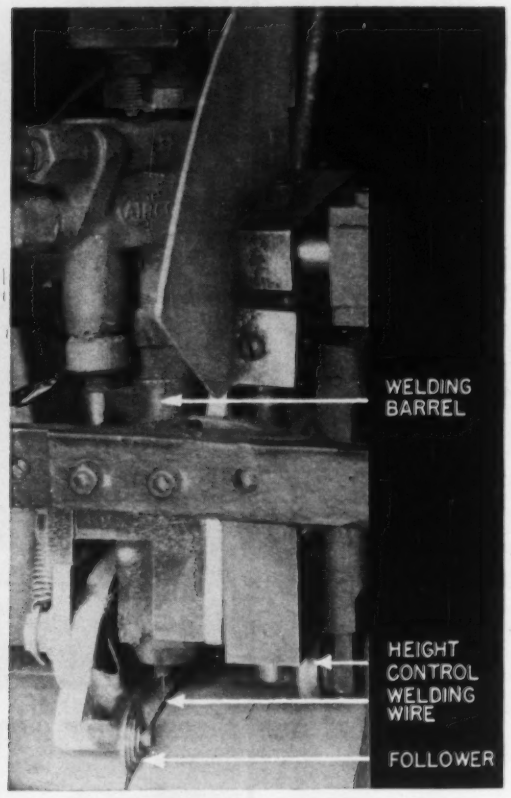
• Average tape cycle is 6 minutes. The time for a complete inspection, including mounting and unmounting of two panels, is about 15 minutes.

After panels are mounted into test fixtures, eight to ten clamp-on connections make contact with terminal blocks on the periphery of the panel. There is an individual fixture for each machine, and each fixture has its own set of cables and connections.

• Before developing the tape device, Warner & Swasey used a mechanical drum with pins and dogs simulating the equivalent controls on the machine.

Although the unit was satisfactory from an inspection standpoint, it was not flexible enough to handle each of the circuits of the expanding line of different bar and chucking machines.





Portability, CO_2 shielding, accurate joint preparation offered, as . . .

Pipeline Welding Goes Automatic

• AUTOMATIC, PORTABLE pipe-welding, long sought by construction firms, is a reality.

That's the opinion of Air Reduction Sales Co., a division of Air Reduction Corp., New York, which last week revealed its new device for girthwelding steel pipelines in the field. CO_2 shielding is used. The method was developed in conjunction with Esso Research & Engineering Co., New York, and Battelle Memorial Institute, Columbus, Ohio.

These features are termed important by Airco:

- Welding speeds (up to 55 ipm) match or exceed present construction rates.
- Only one pass is needed to complete welds in 5/16 in. wall thicknesses.
- The process can handle all pipe diameters.
- Few operators are required.
- Underbead cracking is eliminated (an occasional problem with present methods, says Battelle).
- No backing rings are required.
- Weld quality is excellent.

• Success of the process is achieved through accurate control of joint dimensions and welding conditions, novel techniques, and the latest in equipment advances, says Airco.

The device is being built by Air Reduction for lease to construction firms. It employs a rotary carriage which prepares the pipe ends and welds them in two, 360 degree rotations. All welds are made downhill.

One of the key features is a narrow weld area, a small molten zone, and a fast cooling rate. Here's the operating sequence:

Once the pipe ends are in position, a conventional, internally expanded clamp holds the pipes in position. During the first 360 degree rotation (counterclockwise), the joint on one-half the pipe is prepared by cutting a narrow space between the pipe ends with an abrasive cutoff wheel (costs are about 1 cent a weld inch, says Airco). The welding head, mounted directly opposite the cutting wheel, takes over at half rotation to weld the prepared half of the joint in a downhill direction.

As that half is completed, the cut-

(*Please turn to Page* 141)

Pivot pin placed in fixture mounted anvil . . . dial loaded on anvil . . . fixture slid into position . . . rivet set in dial and crimped to pivot pin.

PAR Process Riveting Eliminates Machined Part . . . Saves 5¢ on Every Dial for Dinsmore Instrument Co.

It's the world's oldest maker of automobile compasses, but Dinsmore is modern as the day after tomorrow when it comes to searching out cost-cutting production processes.

Take the little item of attaching the pivot to the dial with a relatively costly screw machine part. Could a way be found to do it with a rivet and an automatic riveter? A way that would not sacrifice essential high accuracy in concentricity and length of the completed assembly?

Dinsmore got a "Can Do" answer from the TRS man, trained in the PAR Process approach to problems. A specially designed rivet, anvil and simple fixture for a TRS Riveter ended all need for a screw machine part . . . actually saved 5¢ each time the TRS Riveting Machine clicked home another rivet! A total saving of over $5,000 a year on automobile compasses led Dinsmore to use the same method for reducing costs of marine and aircraft compasses.

FIND OUT what the PAR Process can save you

The PAR Process starts with a search by your TRS man for ways to eliminate or simplify and speed up steps in assembly. It is made effective by specially organized TRS procedures, backed by unique TRS developments in rivets and riveting machines.

The PAR Process may bring you better integration and greater automation of assembly operations, or even a cost-cutting change in basic assembly method. Ask for a check of your operations . . . it can be worth dollars to you.

Don't Buy Riveting Machines until you learn how the TRS **PAR** *process revolutionizes riveting*

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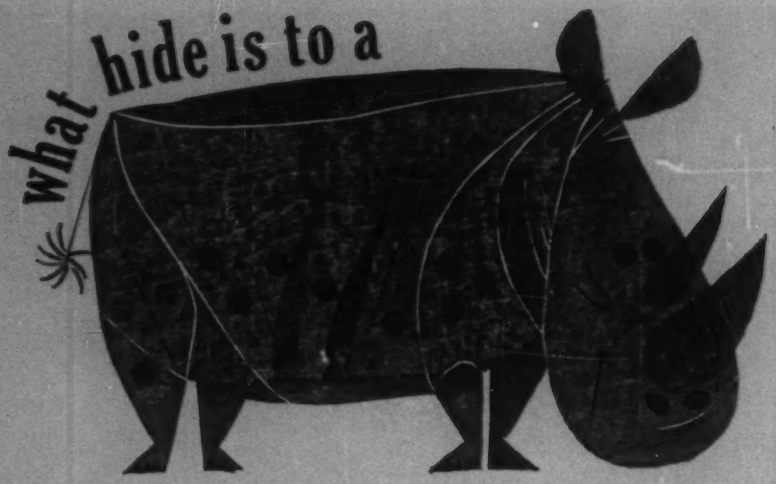

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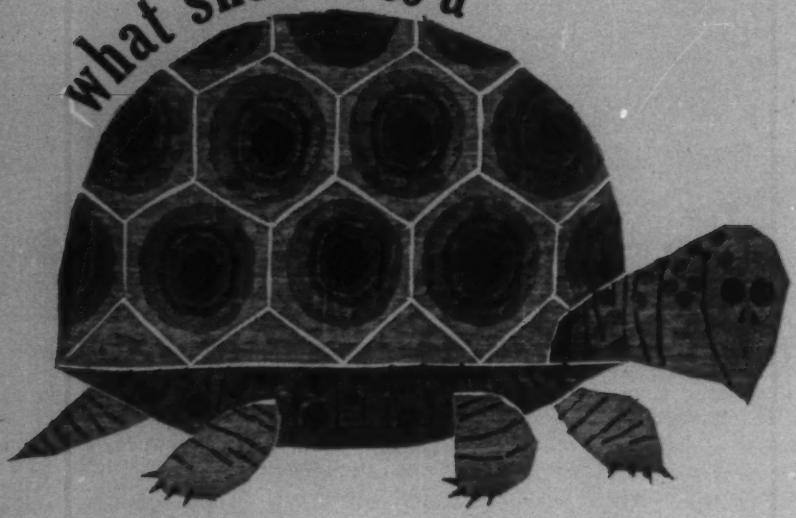

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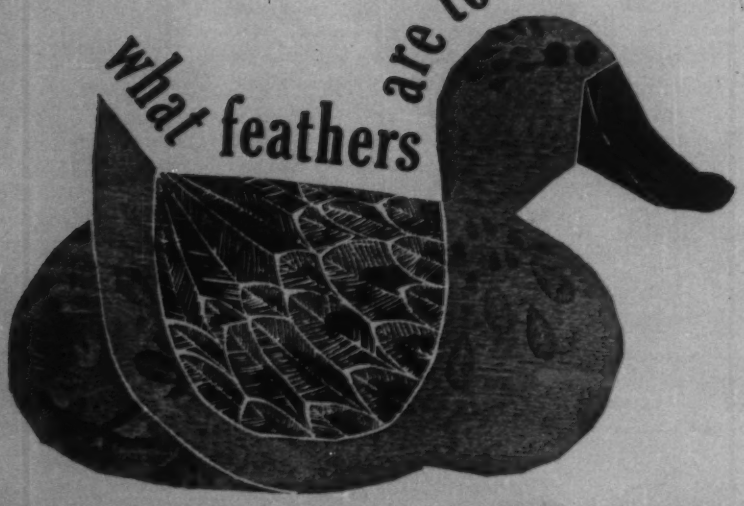

... TI-CO® IS TO ANY PRODUCT WHERE MOISTURE AND CORROSION ARE A PROBLEM

In automobiles—underframe components, mufflers, other exposed parts, all benefit from the corrosion-resistant properties inherent in TI-CO galvanized steel.

In farm equipment—waterers, feeders, brooders, grain dryers, grain bins, implements, conveyor equipment and hardware—all need the protection given by TI-CO galvanized steel.

In appliances—Integral components of washers, dryers, refrigerators, freezers, air conditioners, all meet moisture head on—last longer, give better service, with TI-CO galvanized steel.

In construction—heating and air conditioning systems, cellular flooring, roof decking, siding, flashing, even entire buildings are built from long-lasting, non-flaking TI-CO galvanized steel.

What's more, today's value-minded buyers demand products that give bonus years of useful service. That's why merchandising-minded manufacturers are specifying TI-CO galvanized sheets—using the famous TI-CO brand name as a plus feature in their promotion stories, too.

INLAND TI-CO GALVANIZED SHEETS

INLAND TI-CO

INLAND STEEL COMPANY
30 West Monroe Street, Chicago 3, Illinois
Sales Offices: CHICAGO • DAVENPORT • DETROIT • HOUSTON • INDIANAPOLIS
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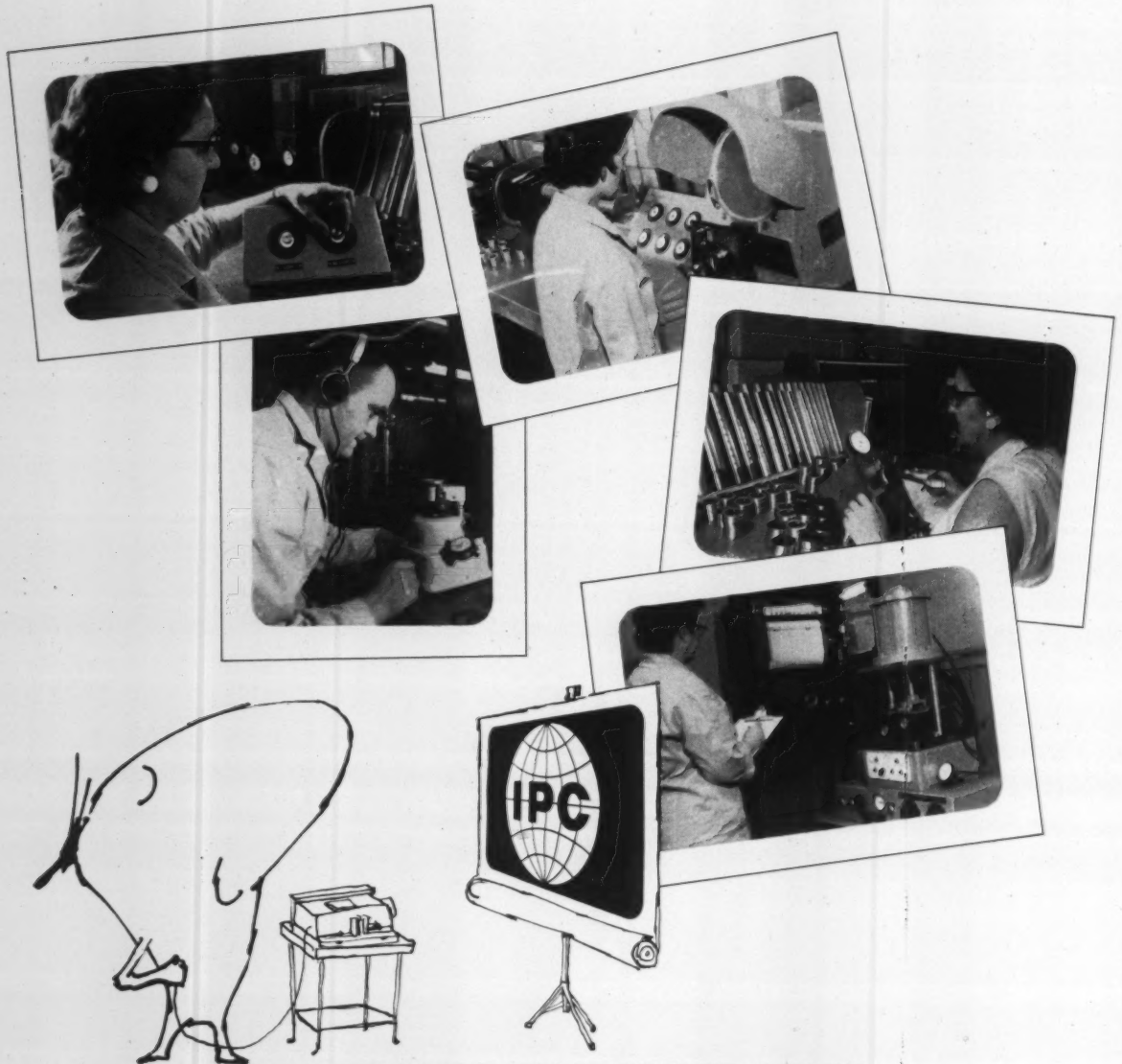


DOES YOUR OIL SEAL VENDOR ACCEPT QUALITY CONTROL AS *HIS* RESPONSIBILITY?

To insure performance from their products, manufacturers constantly look for means of assurance that their purchased components are manufactured to high standards. In many cases this requires costly inspection, sorting or testing.

If you conduct such tests on Oil Seals, for example . . . How well equipped must you be? What size sample should you take? How proficient must your inspection be?

We can tell you – *in fact we can show you* . . . for IPC has pioneered the most complete, exhausting QC procedures that exist anywhere in the Oil Seal industry. Modern equipment operated by highly skilled technicians control every phase of IPC's production.

That explains increasing demand for IPC products. It also explains why our customers have fewer inspection headaches.

Why not get your next Oil Seal problem to IPC? You can rely on our "custom" approach to your problem and we will be happy to show you the elaborate QC steps that will insure the results *you* want.

IPC

OIL SEALS
PACKINGS
PRECISION MOLDING *Custom designed for your application*

INTERNATIONAL PACKINGS CORPORATION

© IPC

Bristol, New Hampshire P3

(*Continued from Page* 136)
ting wheel is in the proper position to prepare the remaining half of the joint. The rotation is reversed, and as soon as the cutting wheel is finished, the welding head again takes over and completes the joint.

By preparing the second side after the first is welded, the cutoff wheel prepares the weld metal ends in the area where the first and second welds overlap.

The abrasive cutoff wheel is selected to provide fast cutting speeds without coolants. The wheel also controls root spacing to promote weld quality.

• In addition to spacing, several other factors are important in controlling weld speed and quality, says Airco.

Factors include:

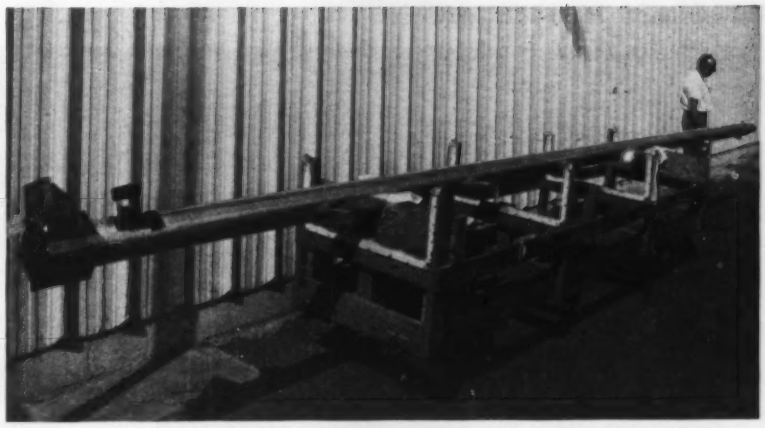
1. Wire feed and travel speed (they govern welding current); heat input, and weld penetration. (All are controlled by a tachometer feedback, direct current, thyratron controlled motors for feed wire and rotational drives.)
2. Contact tube to work distance, which affects weld penetration. (It is held constant by a roller which rides the pipe surface.)
3. Wire alignment. (Guided by a groove follower.)
4. Welding head angle. (Fixed stops on the mounting bracket locate the welding head barrel.)

Arc characteristics are further regulated by automatic and manual controls. A constant potential, direct current power source is needed.

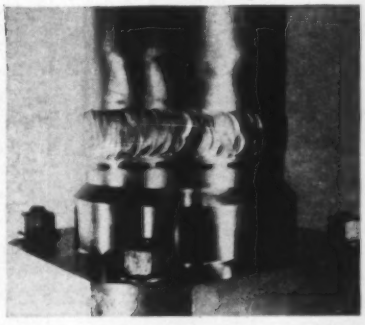
Device to Aid Standards

ONE of the most intense sources of ionizing, electron beam radiation will soon assist scientists at the National Bureau of Standards. They'll use it in developing better standards for measuring x-ray intensity and dosages and in studying fundamental photonuclear reactions and fundamental electromagnetic interactions.

The unit, which can develop 150 million electron volts, is 100,000 times larger than those currently used by the bureau. Cost: $1.7 million, says the builder, High Voltage Engineering Corp., Burlington, Mass.



Distortion Held to 0.003% In Welded Zirconium Tube



• PROBLEM: Weld a 5½ in. zirconium tube 27 ft long without distorting its straightness more than 0.005 to 0.010 in.

SOLUTION: A portable shielding booth, fixturing, and a carefully planned technique employing tungsten shielded arc (Tig) method.

The problem was posed by the National Reactor Testing Station, Idaho Falls, Idaho, General Electric Co.

Rohr Aircraft Corp., Chula Vista, Calif., did the work.

• The project required the building of a device which is expected to improve reactor efficiency. It is a 27 ft aluminum clad zirconium tube with walls ⅛ in. thick. Five circumferential welds joined six pieces.

Zirconium was chosen because it has a low neutron cross section for high reactor efficiency; it resists the corrosive effects of radioactive hot water and retains its physical strength for long periods in a reactor environment.

To prevent oxygen or hydrogen contamination, all welding had to be done within a completely protected atmosphere. A box constructed by Rohr technical people enabled the operator to move along the entire length of the tube without elaborate seals and air locks.

Each weld was made with eight circumferential passes. An operator welded for about 10 minutes (he could complete one-fourth a circumference in that time) then allowed the metal to cool.

When the tube was finished, it was covered with a welded aluminum sleeve.

Although Rohr has constructed similar tubes, this one required unusual care to maintain tolerances, engineers claim. No experiments were permitted since zirconium costs $40 a pound.

X-ray examination of the completed welds revealed no flaws.

Blast furnace device developed and applied successfully by steel firm . . .

Licensee Makes Nuclear Stock Gage

• MORE ACCURATE determination of blast furnace burden level and closer control of the ironmaking process are said to be possible with a nuclear device developed at the Electromechanical Research Center, Cleveland, of Republic Steel Corp. (see STEEL, Oct. 12, 1959, p. 120).

A license to manufacture and market the device (called the Stockray) has been granted by Republic Steel to Airborne Instruments Laboratory, Deer Park, N. Y., a division of Cutler-Hammer Inc.

Terms of the license agreement: Cutler-Hammer is authorized to design, build, and sell systems based on the original units and to make design improvements where possible.

• The device permits continuous indication or recording of the burden level and makes furnace operation more efficient.

The system is said to provide accurate and continuous stock level measurement and to give a general indication of burden distribution or contour. A permanent record is obtainable with a 24 hour, round chart recorder, or with a continuous, strip chart device. Remote stock level indicators can be installed in the cast house or the stock house.

Gas leakage, a problem on furnaces operated at high blowing rates and high top pressures, is eliminated by replacement of the conventional stock gage—a weight suspended on a cable that passes through an opening in the furnace top.

The device is adaptable to automatic charging or other automated blast furnace operations.

• How the system works: Radiation sources send rays from one side of the furnace to detector units on the opposite side.

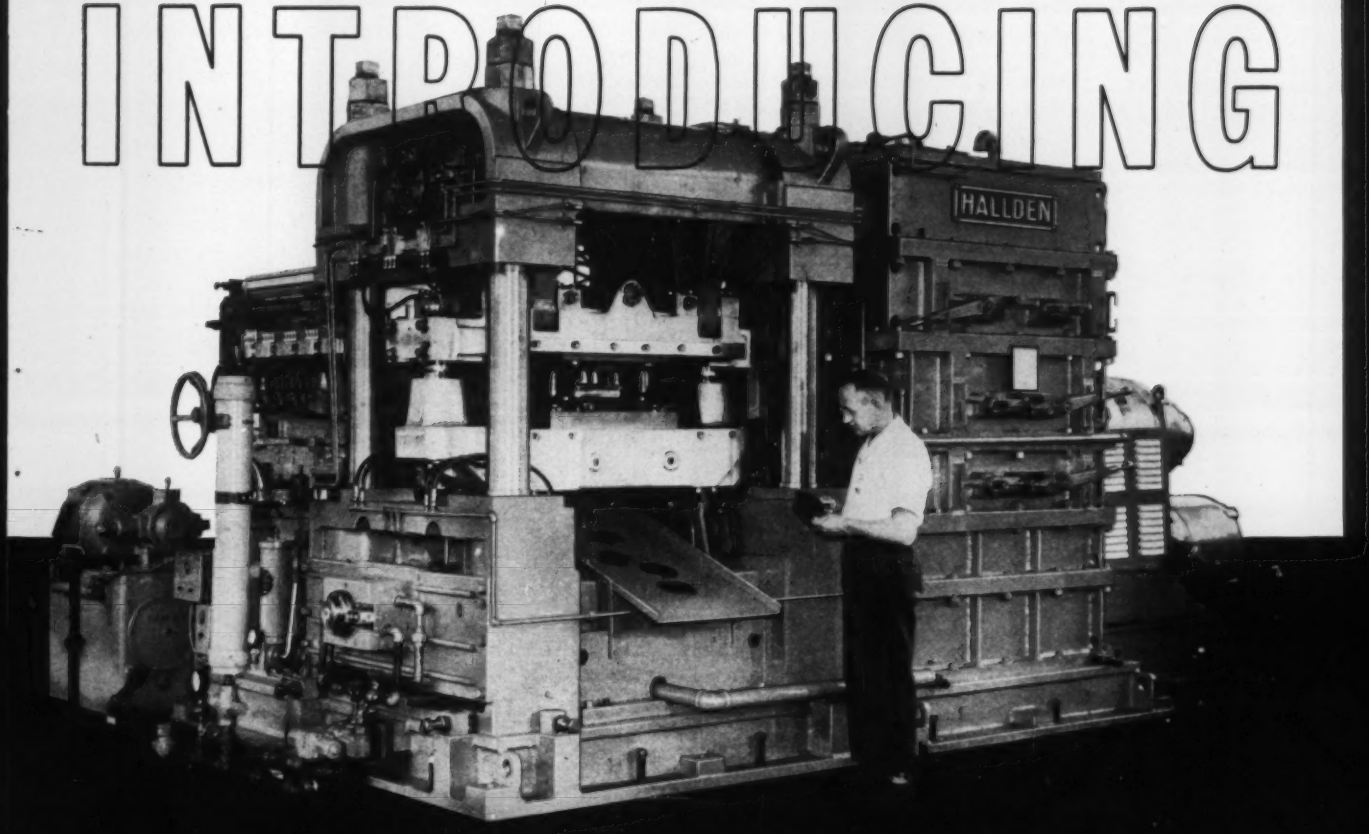
Presence or absence of radiation is determined by the detectors—when stock inside the stack obstructs a radiation beam, presence of burden at that level is sensed by the detecting unit.

Output from each detector box is fed to an amplifier and control circuit in the main control cabinet. A signal light on the cabinet (and on remote panels) indicates when the burden drops below each detector level. Appropriate arrangement of the lights makes possible a graphic representation of the stock level. And the recorder makes it possible to keep a running account of the stock level and the bell dumpings.

The number and arrangement of sources and detectors can be varied with requirements at individual plants. Typical arrangement: Four source-detector pairs mounted in the wall of the stack and aligned in the

(*Please turn to Page* 146)

INTRODUCING



THE NEW DUAL HALLDEN SYNCHRONIZED *FLYING* PRESS AND SHEAR WITH INTEGRAL LEVELLER

- **Continuous Uniform Feed Directly from the Coil**
- **Open Construction for Easy Accessibility**
- **Unlimited Cut Length Range**

Latest Addition to the World Reknown Family of

HALLDEN FLYING CUTTING MACHINES

Equipped with micrometer adjustments for synchronization and feed while the machine is in motion

Engineered and built to meet individual requirements for blanking, shape or square type cutting, or any combination —

Write for design survey of your specific requirements.

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HALLDEN

THE SHEARING SPECIALISTS

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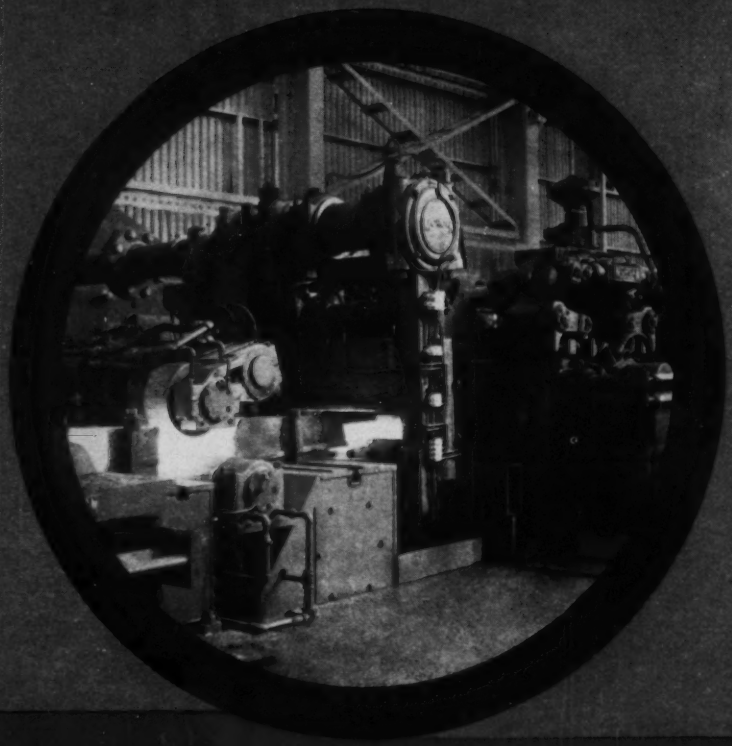

OF 235 MILLS

WE HAVE ENGINEERED

THE WORLD OVER

200 HAVE BEEN

BOUGHT BY PLANTS

HAVING ONE OR

MORE MORGAN MILLS

235 MORGAN MILLS AROUND THE WORLD

149 UNITED STATES	2 AUSTRIA
28 GREAT BRITAIN	2 SPAIN
11 FRANCE	2 ARGENTINA
9 GERMANY	2 LUXEMBOURG
8 INDIA	1 HOLLAND
7 AUSTRALIA	1 ITALY
6 CANADA	1 RUSSIA
4 BELGIUM	1 SWEDEN
1 NORWAY	

MORGAN
WORCESTER

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management wants profit— millmen need efficiency

MORGAN

has the know-how to build more of each into YOUR MILL

Today's mill must be designed with tomorrow's gauge of operating efficiency and economy foremost in the builder's mind, if it is to compete successfully in the fierce race of the 60's for market advantage.

For each of the critical production problems of the era — roll it faster, roll it at lower cost per ton, roll it to ever higher standards of quality — Morgan's unparalleled backlog of design and construction knowledge provides tangible assurance of effective solutions. Here the essential vigor and vision of engineering concepts are soundly balanced, but never stifled, by a depth of experience unique in the industry — bringing the significant advances to bear early and **profitably** on your individual mill's performance requirements.

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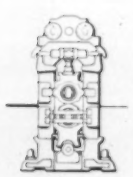
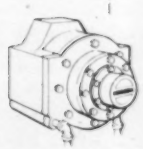
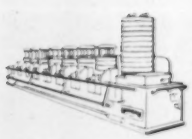
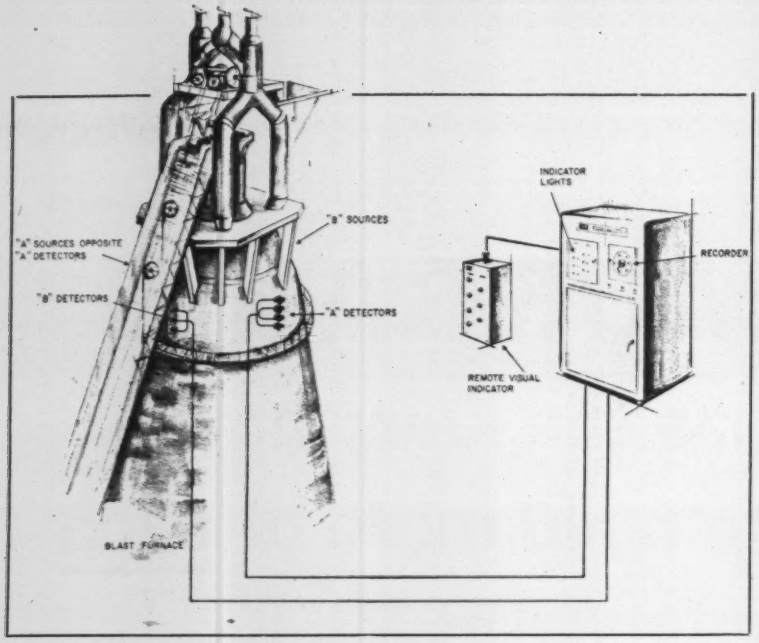

ROLLING MILLS


MORGOIL BEARINGS


WIRE DRAWING MACHINES

COMBUSTION CONTROL

THE KEY NAME FOR PROGRESS IN STEEL-MAKING EQUIPMENT



NUCLEAR STOCK GAGE employs pairs of gamma ray sources and detectors, mounted on opposite sides of the stack. Interruption of the beam from a source to a detector indicates burden material at that level. Output from each detector is amplified and applied to a light circuit in the main control cabinet. Recorder charts keep an account of stock level and bell dumpings

(*Concluded from Page* 142)
East-West direction and three pairs aligned in the North-South direction. Beam paths might pass through the stack at 6 to 14 ft below the blast furnace bell.

• Gamma rays are employed in the system because they have good penetrating power but can be handled safely.

Cobalt 60 is used as a source of the gamma rays. It cannot induce radioactivity in any material it strikes and doesn't dissipate quickly. The same source material can be used continuously for at least five years—about the average life expectancy of the furnace lining—without replenishment.

The source holder is constructed of lead and stainless steel and provides adequate personnel shielding. A shutter on the device can be closed for safe shipment. The radiation level is low enough for safe handling. When the holder is mounted on the furnace, the shutter is opened and a warning flag is displayed automatically.

Geiger-Muller detector tubes are mounted in weatherproof, cast iron enclosures, which are bolted to furnace brackets. A small radiation source, incorporated in each detector, is used to check operation of the detector and its associated amplifier. The source never has to be replaced and it's so small that it doesn't require government licensing.

• Rugged circuit design and construction make for high reliability.

Maintenance is kept at a minimum by solid state (transistorized) circuitry and by careful location of system components. Example: Radiation sources are mounted on the outside of the furnace and aimed through ports in the side of the stack. That prevents contamination of the burden with radioactive material. All possible parts of the system are built into the main cabinet to minimize test and repair activities at the furnace top.

The first nuclear stock gage was put into operation by Republic Steel in 1958 on one of its Chicago furnaces. Another was installed at the company's Buffalo facility in late 1960. Both units have been in operation since installation, with no furnace shutdowns for maintenance work.

Pneumatic Sand Unloader Cuts Manhours 75 Per Cent

• A PORTABLE pneumatic sand unloader cut manhours 75 per cent at the Groton, Conn., plant of General Dynamics' Electric Boat Div.

One man now unloads a boxcar of sand in 8 hours, grit in 6 hours. That is a 75 per cent saving compared with 32 to 55 hours formerly required for eight men to unload a boxcar of foundry sand to the storage bin. For blast cleaning grit, it took six men 24 to 30 hours.

The convenience factor is high. Formerly, a boxcar had to be tied up until a crew of six to eight men could be found. Now, unloading proceeds quickly, day or night.

• The job involves unloading foundry sand and blast cleaning grit from boxcars to one of three bins in different plant locations.

To unload a boxcar, the collector is moved by crane, attached to a hatch above the appropriate bin, and connected to the unloading tool through quick connect couplings in the conveying piping. As soon as the blower motor is turned on, a vacuum is created in the conveying line and unloading proceeds.

The company reports good service life. In the first six months of operation, handling about 40 boxcars of sand and grit, only the conveying piping system has shown wear. The setup was made by Allen-Sherman-Hoff Co., Wynnewood, Pa., a division of A-S-H Industries.

Missle Parts Upgraded With Air Abrasive Tool

PRODUCTION of small but important parts for missiles is expedited at Electronics Mechanics Inc., Clifton, N. J., with an abrasive tool supplied by the Industrial Div., New York, S. S. White Dental Mfg. Co. The tool (called Airbrasive) deburrs, deflashes, and cleans molded, glass bonded, mica flexural pivots with a supersonic stream of gas propelled particles.

Use of the tool is said to have boosted daily production from eight parts per worker to 300 and reduced rejection rates from 50 per cent to less than 10 per cent.

UC STEEL BETTER STEELS FOR BETTER PRODUCTS

NEW
FREE MACHINING
UNILOY 303MA*
STAINLESS STEEL

- MACHINES UP TO 50% FASTER
- LENGTHENS TOOL LIFE

Uniloy 303MA is a free machining grade of chromium-nickel stainless steel developed by Universal-Cyclops. It has been proven greatly superior to AISI Type 303 in key plants throughout the country.

Production tests have proved that Uniloy 303MA machines up to 50% faster than Type 303. Cutting tools last longer, decreasing tool cost and machine down time. Completed parts have a better finish than is possible with Type 303, and the corrosion resistance is far superior.

*Patent No. 2,900,250

Send for a copy of our new brochure containing complete data on Uniloy 303MA, and for Performance Reports citing dollar savings achieved by satisfied customers.

Contact your nearest Universal-Cyclops steel service center or sales office. Uniloy 303MA is AVAILABLE FOR IMMEDIATE DELIVERY.

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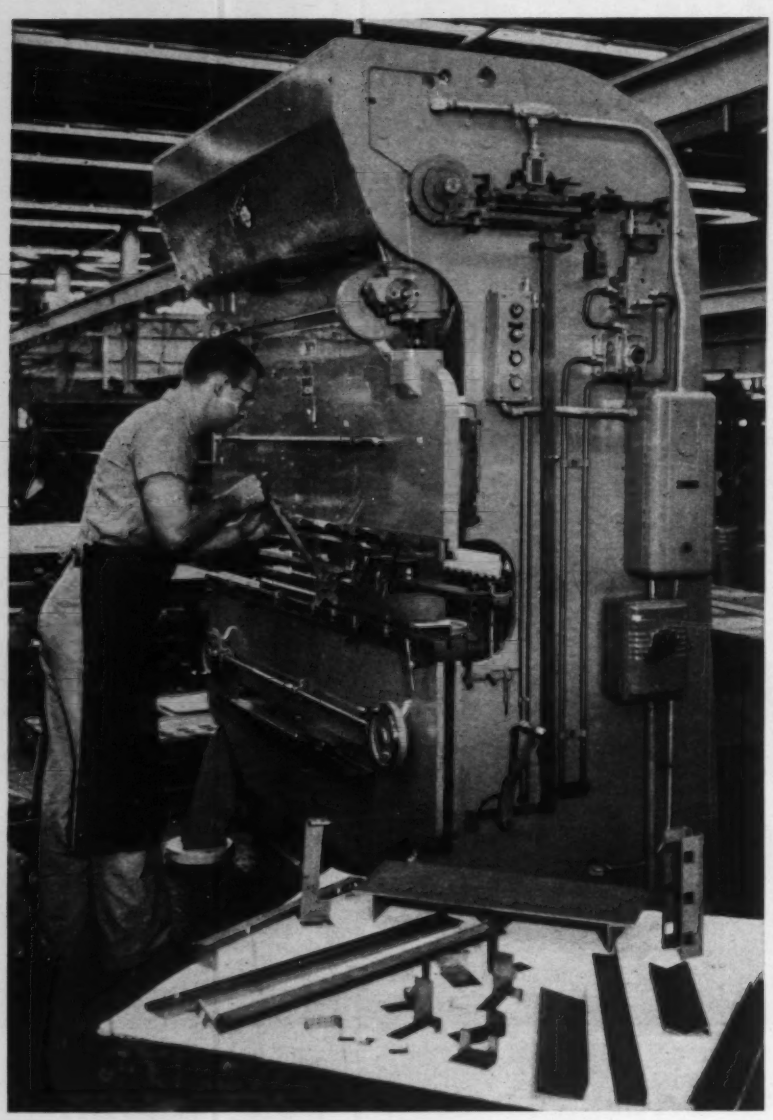
EXECUTIVE OFFICES: BRIDGEVILLE, PA.

STAINLESS STEELS • TOOL STEELS • HIGH TEMPERATURE METALS



Rapid working plus fast die change on

Press Brake Saves Time, Improves Operator Safety

RAPID working features of the 25 ton Di-Acro press brake, such as adjustable stroke and fast die change, have reduced over-all production time by 20 per cent, says Fred C. Kehn of GE's Industry Control Dept., Salem, Va.

The press brake has an adjustment that permits GE to shorten the stroke to the narrowest practical opening for any given operation.

Full power is obtained at all times regardless of stroke length. "The adjustable feature enables us to get what we actually need with no waste of motion or time," says Mr. Kehn. "The shorter the stroke, the more strokes there are per minute. Power and ram speed remain constant, but you get more strokes in less time when the mechanism has a shorter distance to travel."

• The unit can work within tolerances of 0.002 to 0.005 in.

GE is forming to a tolerance of ±0.010. The final ram adjustment, regulated to 0.001 in. and the leveling of the tooling to ±0.001 in. provides sufficient cushion to insure rapid output of thousands of formed pieces without checking of gage accuracy, says Mr. Kehn.

• It takes about 1½ minutes to change a die.

"That is about half the time required to change dies on our other units," Mr. Kehn says. "In terms of production time, this translates itself into appreciable time savings, considering that we make 25 to 35 die changes each 8 hour shift." GE uses such dies as 4-V combination, hemming, flattening, 45 degree, double bend with an ⅛ in. offset, and curling types; three single 90 degree dies, and a Wales Strippit die for piercing and notching.

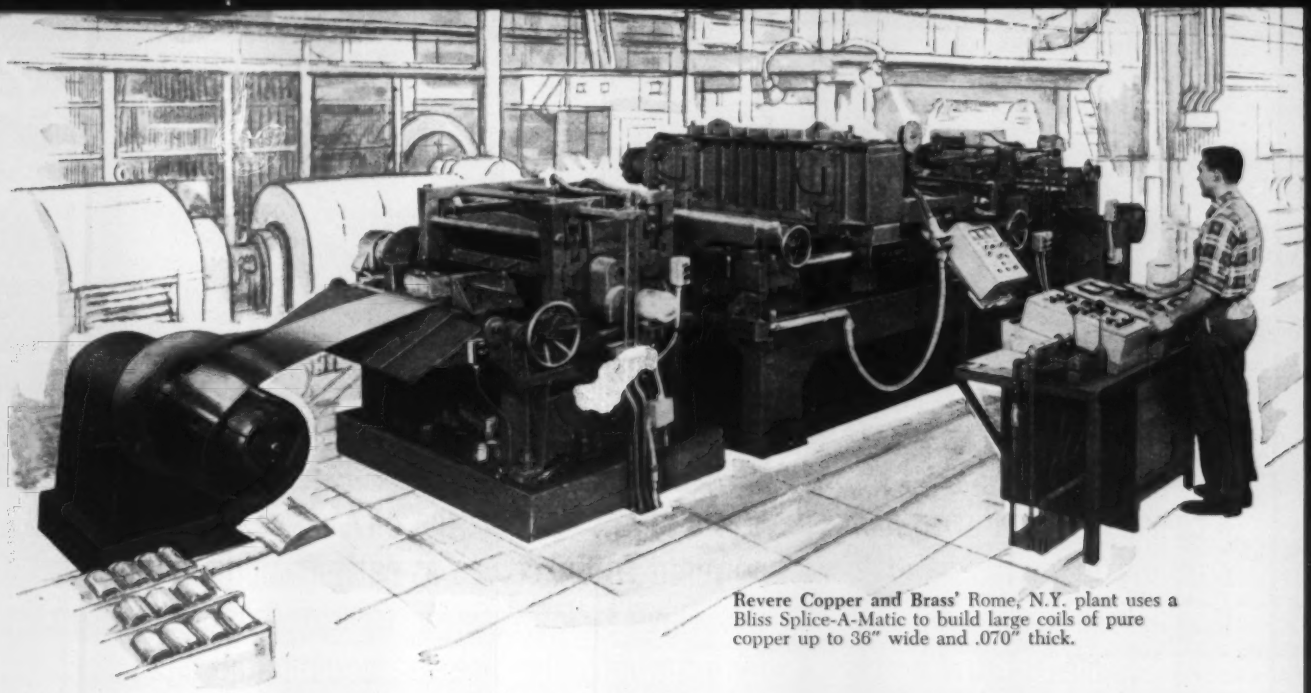
• The GE plant's safety record has improved.

The ram has complete operator control. It can be stopped and reversed at any point during an operating cycle. The dual speed operating cycle eliminates operator injuries due to whipping of material and it also cuts costly kinking damage to workpieces.

GE forms an average of 20 to 25 different kinds of parts daily, putting an average of 250 to 300 pieces through the machine to fill work orders varying from 5 to 200 pieces. The material processed in the press brake includes steel to 0.105 in. (12 gage), aluminum to ⅛ in. and copper bus bars to ¼ in. thick.

• About 15 per cent of the metal forming work at the plant is done on the 25 ton press brake, the other 85 per cent by nine press brakes in the 100 to 600 ton range.

Most of the heavy forming work is done on 200 ton units. The largest units are used for combination piercing and forming. The 25 ton unit was made by Di-Acro Corp., Lake City, Minn.



Revere Copper and Brass' Rome, N.Y. plant uses a Bliss Splice-A-Matic to build large coils of pure copper up to 36" wide and .070" thick.

How much could these machines reduce your coil handling costs?

Substantially, if your requirements are at all similar to those of Universal-Cyclops Steel Corporation or Revere Copper and Brass. Universal-Cyclops uses a Bliss Splice-A-Matic welder to cut handling costs in welding carbon and stainless steels, getting ideal welds in even the 300 series.

Revere Copper and Brass uses *its* Splice-A-Matic to build up the larger coils preferred by many of its customers . . . now also finds that these larger coils cut down-time and set-up time in its own subsequent operations.

Just about any weldable material and coil size is practical with the Bliss Splice-A-Matic. It's been used on most alloys in widths to 60" and with both coils and cut-to-length sheets. And complementing the Splice-A-Matic, Bliss offers a complete line of annealers, trimmers, pinch roll stands, levelers, reels, and other units to form a complete, modern coil build-up line.

To learn how others are automating their coil handling and cutting costs write today for complete information.

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Bliss is more than a name
. . . it's a guarantee

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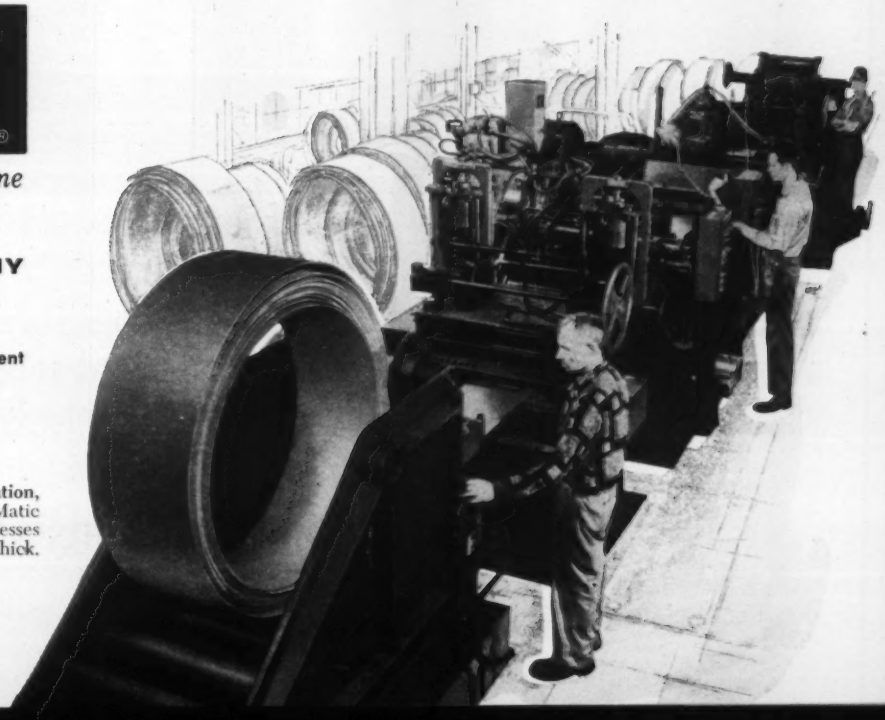
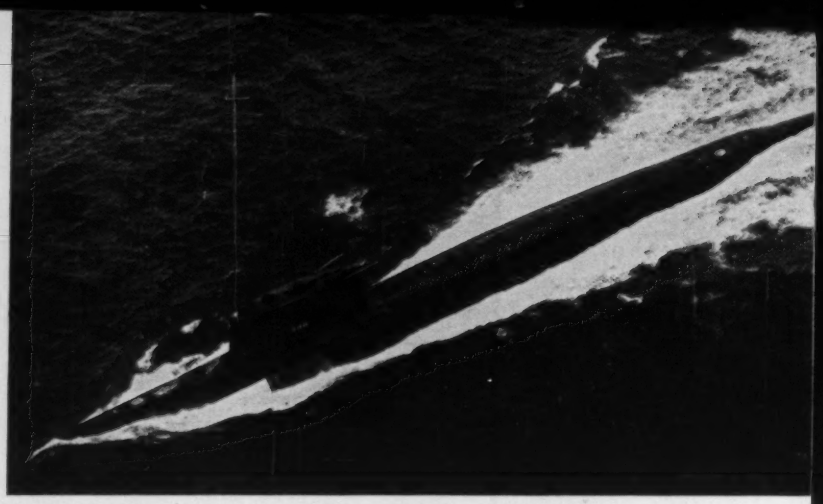


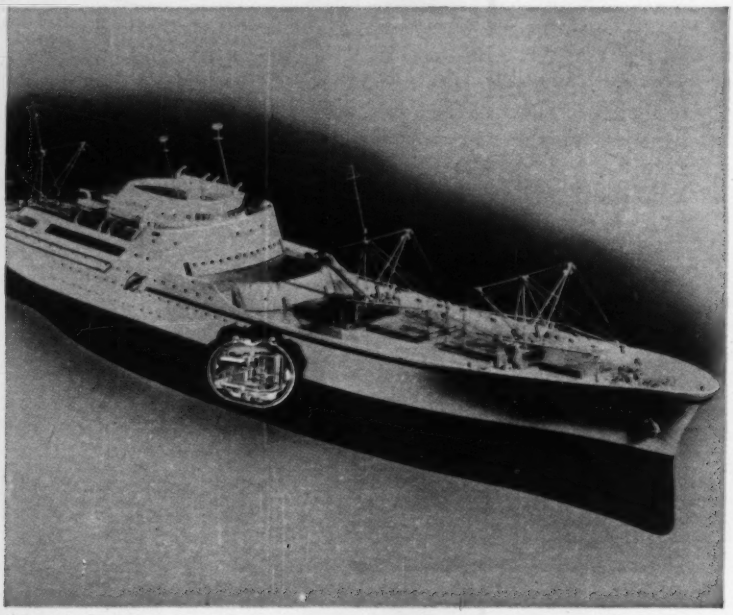
At Universal-Cyclops Steel Corporation, Bridgeville, Pa., a Splice-A-Matic successfully welds 300 Series stainlesses 18½" wide and 0.135" to 0.195" thick.

A company's reputation hangs on many things, including door hinges. This washer maker uses Stainless 430 Wire from Carpenter Webb Wire Division.



World's largest submarine, 447-foot, 5900-ton, atom-powered Triton, serves as early warning station for U.S. Navy task forces. Incorporated into its design for extra reliability are periscope mountings forged from Carpenter Stainless No. 4A (Type 304) Steel.

Family begs for eggs, thanks to this automatic skillet. Carpenter Low Expansion "42" Alloy in thermostat assures even temperatures...and tempers.



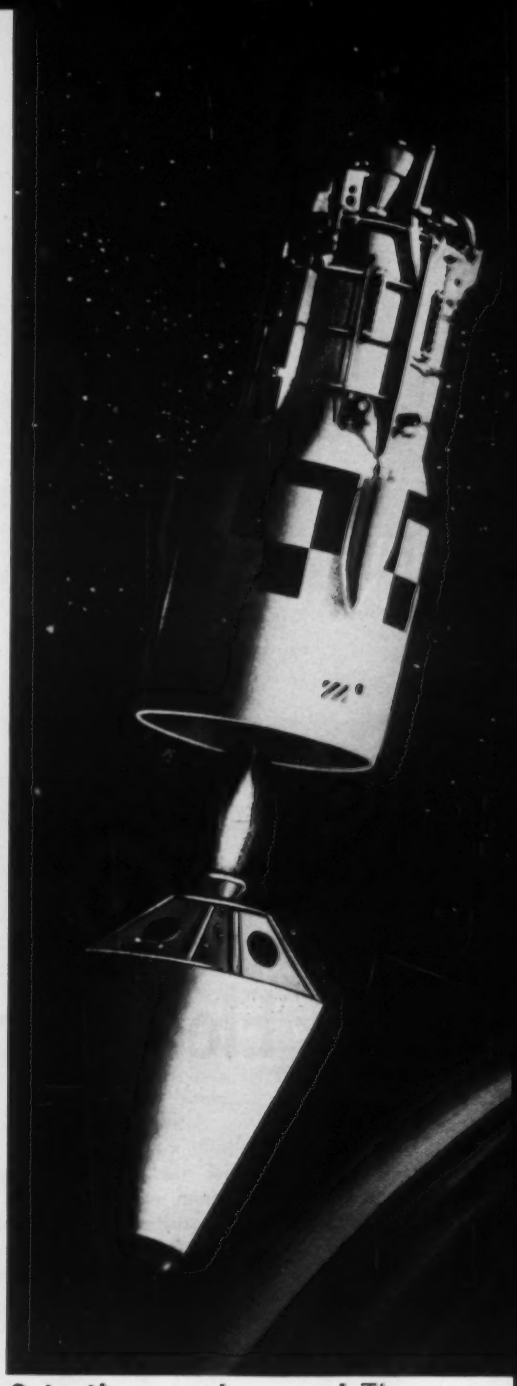
World's first nuclear-powered merchant ship, N.S. Savannah, will cruise for over 350,000 miles on one atomic fueling. The fuel assemblies for the Savannah power reactor contain 121 fuel rods clad in dependable Carpenter Type 304 Stainless Tubing.

you can do it consistently better with

The Carpenter Steel Company, Main Office and Mills, Reading, Pa. / Export Dept., Port Washington, N.Y.—"CARSTEELCO"

Everything adds up... to extra reliability in this famous-make bookkeeping machine. Contributing to its reliability are components shaped from Carpenter TGS Tool Steel. Again and again, wherever you find reliability a factor, Carpenter is first choice.

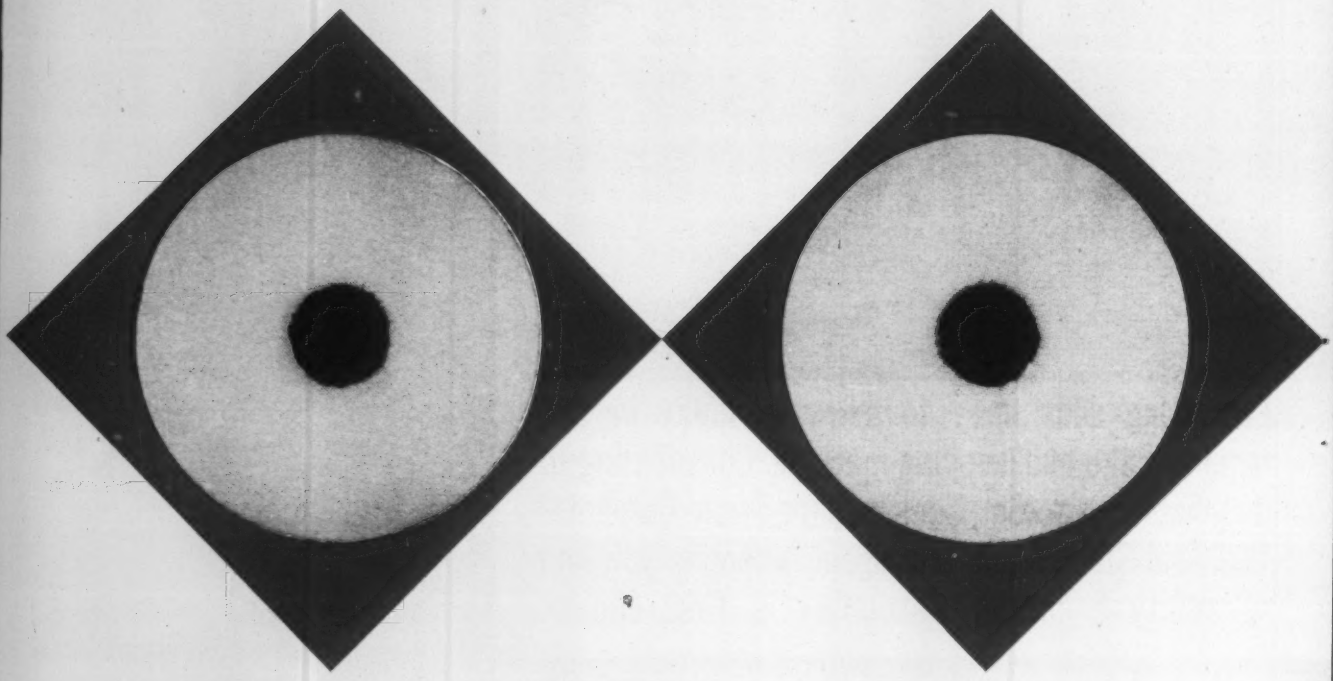
Research that profits you! From Carpenter's metallurgical laboratories come new tool steels to meet the demands of industry. Latest example: HI SHOCK 60 for applications involving extreme shock resistance. Now stocked for immediate deliveries.



Sets the pace in space! The "Discoverer" scores high on predictable performance. Used forgings of Carpenter High Temperature N-155 Alloy.

Carpenter Specialty Steels for Specialists

Alloy Tube Division, Union, N.J. / Webb Wire Division, New Brunswick, N.J. / Carpenter Steel of New England, Inc., Bridgeport, Conn.



DUST SPOT TEST determines efficiency of electronic filters. Uncleaned air contaminated one test target (left) in only 12 minutes, but it took 120 minutes to produce equal contamination on the same kind of filter with precleaned air

Electronic Systems Purify Air for

• CLEAN AIR for metalworking plants can be obtained with minimum maintenance and operating costs from electronic air filter systems, says E. R. Koenig, application engineer, Sturtevant Div., East Pittsburgh, Pa., of Westinghouse Electric Corp.

Many design refinements have been made on the electronic cleaners since their introduction 20 years ago, says Mr. Koenig. Cleaning efficiencies up to 95 per cent are said to more than make up for slightly higher initial cost.

• Low, constant air resistance, low fan horsepower requirements, and minimum operator attention are promised benefits.

Highly soluble, fireproof, nontoxic adhesives used on the filters to hold accumulated dirt can be removed without hot water (cold water is said to do a better job). The adhesives help the system work at top efficiencies and make for easy cleaning—down to the bare metal—during the washing cycle.

An automatic wash system removes dirt from the filters and flushes it down a drain. Actuation of a switch starts the maintenance cycle, which includes the stopping and restarting of fans, de-energizing and re-energizing of power packs, water spraying, water draining time, adhesive spraying, and adhesive draining time.

Filter cleaning takes only 1 to 2 hours a month.

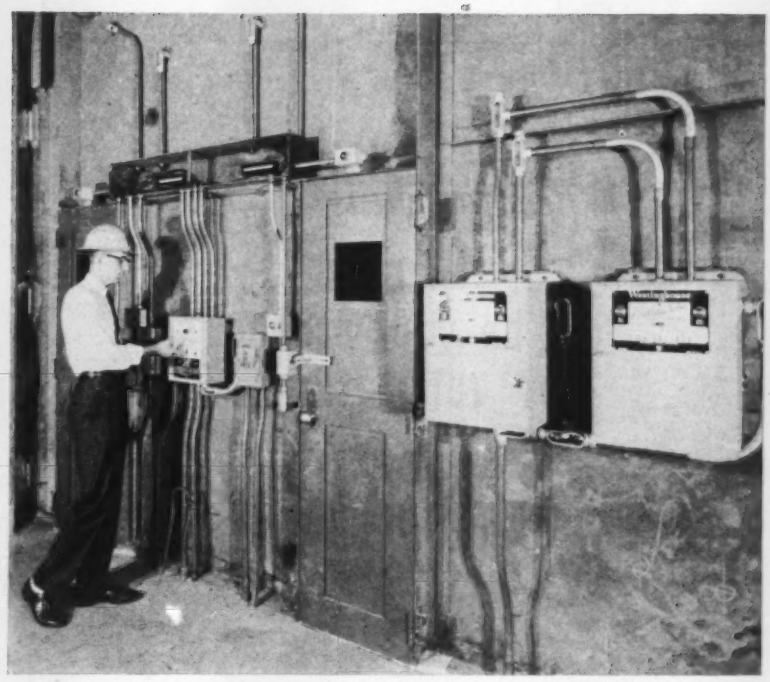
Dual, motorized, washing headers provide maximum penetration and thorough cleansing, by spraying from each side of the collector bank. An afterfilter bank prevents moisture carryover during the washing cycle and serves as a safety barrier.

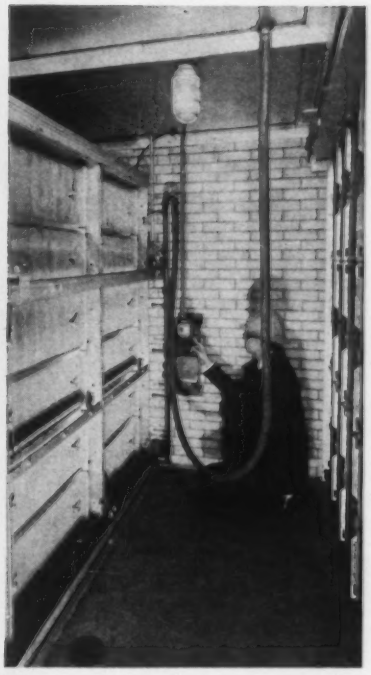
• Purification of air for electrical installations (particularly mill motorrooms) is often handled by electronic units.

Four Precipitron units were installed at National Works, McKeesport, Pa., of National Tube Div., United States Steel Corp., in 1959 and 1960. A 48,000 cfm unit is being used to clean ventilating air for a powerhouse; three other units are incorporated in a blooming mill ventilating system.

One of the blooming mill systems cleans supply air for the controlroom. One purifies air for the forced air ventilated mill motors. The other is used in the main motor-generator set cooling and recirculating system to prevent accumulation of carbon dust.

Automatic sequence controls program the maintenance (washing) cycle on two of the blooming mill





PUSHBUTTON CONTROL (left) initiates the automatic filter cleaning operation, which requires only 1 or 2 hours a month. Right: Downstream side of the air cleaner and the afterfilter bank in a mill motorroom ventilation system

Metalworking Plants

filter systems. Semiautomatic washer controls are used on the other two units.

• Effective removal of large or small particles is a must for protection of expensive electrical equipment.

"Electrical equipment that costs hundreds of thousands or even millions of dollars deserves protection from dirt in the ventilating air," says Mr. Koenig. "Effectiveness of the air cleaning system must not be limited to particles larger than 5 microns in diameter."

The least effective filtering job removes most of the larger particles. But a layer of small particles—containing a great number of small air spaces and offering less chance for free air movement—creates a more serious heat insulation problem in small air passages than does a layer of larger particles. That heat insulation makes for higher machine operating temperatures and sets the stage for electrical grounding.

In direct current motors and generators, certain areas are particularly vulnerable to dust. Example: Creepage paths behind the commutator necks, near the lower coil sides and rear mica V-rings. A thin film of electrically conductive, carbon and metallic dust becomes a breakdown path in the presence of moisture.

Most insulating materials have a lower dielectric strength when they are wet, and creepage surfaces have lower flashover voltages when they are dirty. Some combinations of conductive contaminants on creepage surfaces (such as carbon dust on oil films) tend to track and carbonize the insulating material.

Abrasive particles embedded in the brush face remove the surface film from the commutator and score the surface. That causes poor contact and sparking. And dust also interferes with free movement of the brush in its holder.

• Efficiency of electronic filtration is determined by a dust spot test.

Cleaning power of the electronic units is checked by the U. S. Bureau of Standards dust spot test. Samples of cleaned and uncleaned air are drawn simultaneously through chemical filter papers of identical area. Total air flow through each paper is adjusted until smudge spots of the same intensity are obtained. The uncleaned air soils the filter more quickly than the cleaned air; thus the flow of uncleaned air is interrupted throughout the test, so it will be a fraction of the volume of cleaned air drawn during the same period.

Filter efficiency is then determined as a function of the sampling times for cleaned and uncleaned air.

The dust spot test is said to be a reliable indication of filter effectiveness, because it doesn't employ an artificial dirt-air mixture.

When fastenings fail...

it may be your product's reputation that suffers most

When so much literally hangs on a bolted connection—as in this swing—the importance of a single nut becomes dramatically clear: *If the nut lets go, tragedy!*

In a sense the same is equally true of complex and costly products like farm equipment, washing machines, computers—or any other product you make that is subject to vibration when it is operating.

If your customers can't count on critical connections staying tight under punishing field conditions—and, even should the actual damage be slight—if they're faced with failure and expensive downtime because a nut lets go —you've had it when it comes to reorders!

The moral is clear. You simply can't afford to have your product's reputation for reliability ruined by fasteners that can't be relied on.

For more than 20 years, many of America's top manufacturers have relied on Elastic Stop® nuts to protect their product's reputations. They've learned that Elastic Stop nuts with their exclusive nylon locking inserts *simply will not work loose!* Not under the toughest impact, shock or vibration! Never! They stay put to give your product low cost insurance against fastener failure —the kind of insurance you can't afford to be without!

When you remember that reorders are written in your customers' maintenance records, you'll want to see how these leading companies protect the good name of their products with Elastic Stop nuts. Write for our interesting Bulletin No. 5901 Dept. S46-460, Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.

ESNA®

for the ring **O** *of reliability*

ELASTIC STOP NUT CORPORATION OF AMERICA

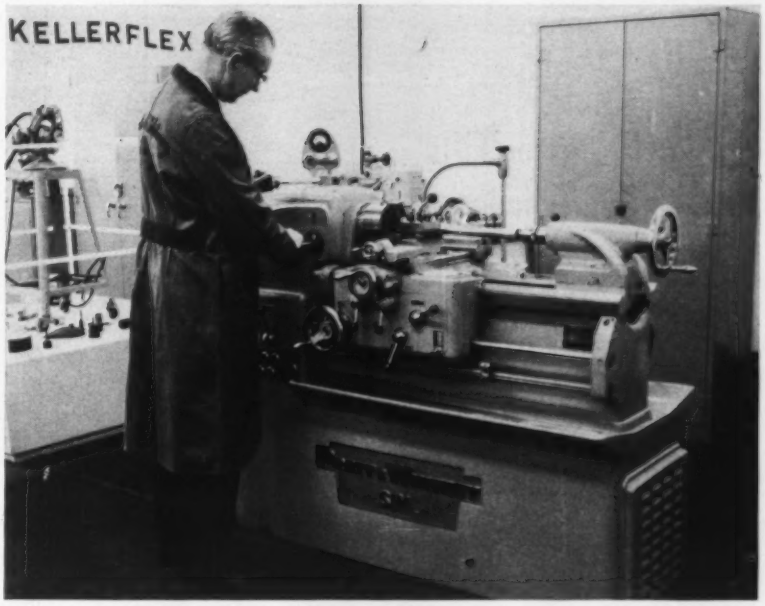
Lathe Handles Small, Medium Job Lot Turning

MADE for fast metal removal, this 7½ hp production lathe is accurate to toolroom tolerances and produces fine finishes at production line speeds, says the manufacturer. It recommends the machine for small and medium job lot turning.

Heavy and delicate cuts can be made. Repeat diameters are picked up quickly and easily. Metal can be removed at speeds up to 2800 rpm. Nine forward and reverse speeds and nine longitudinal and cross slide feeds are provided.

The desired length of cut is automatically obtained by micrometer adjusted, carriage slide stops which trip the power feed to the carriage at any location. The spindle can be run clockwise or counterclockwise at all spindle speeds.

Quick reversing with a full range of reverse speeds allows full utilization of the rear tool post—without chatter. With the reverse feature, the tendency to lift tools from the rear cross slide is eliminated. The unit is being shown at the ASTME tool exposition May 22-26, Booth 2529.



For further information, *write* Pratt & Whitney Co. Inc., West Hartford 1, Conn.

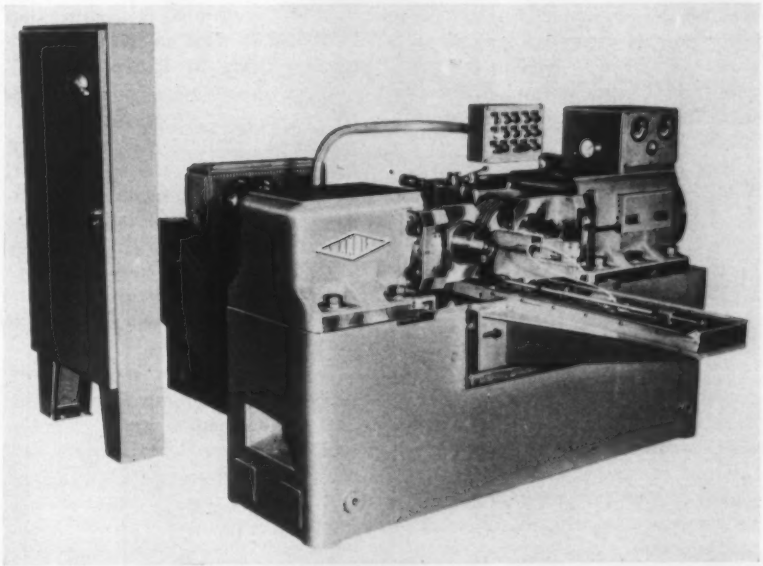
Thread Rolling, Forming Unit Does Heavy Work

A THREAD rolling and forming machine (the Landis Hy-Duty) is designed for thread, form, spline, and gear rolling applications requiring rolling forces up to 200,000 lb.

The nominal diametrical capacity of the unit goes from 0 to 6 in. maximum for infeed rolling and from 0 to 4 in. maximum diameter for throughfeed rolling. Thread lengths of 11½ in. are obtainable for infeed rolling, up to 20 ft for throughfeed.

Infeed cycling is hydraulically operated, infinitely variable, and electronically controlled. Infeed stroke length is variable.

The transmission is powered by a 50/25 hp, 1800/900 rpm motor through speed change gears. Six standard speeds are available from a minimum of 78 to a maximum of



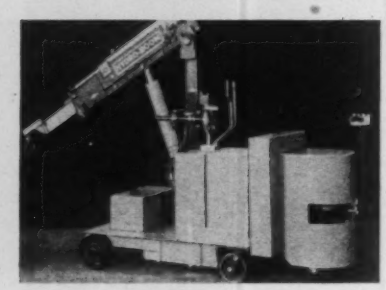
476 rpm for the 50 hp range and from 39 to 233 rpm for the 25 hp range. The worm gear transmission and speed change gearbox are rated as 90 per cent efficient at maximum speed.

For further information, *write* Landis Machine Co., Waynesboro, Pa.

Mobile Floor Crane Lifts 3000 lb Hydraulically

YOU CAN cut labor 50 per cent and allow for greater handling capacity with the Hydro-Boom Model 135 mobile floor crane, says Vanguard.

The unit can lift 3000 lb with the hook 48 in. beyond the front edge of the platform. The self-propelled unit is reported to be highly maneuverable and can make a complete turn in a distance equal to its own diagonal length.

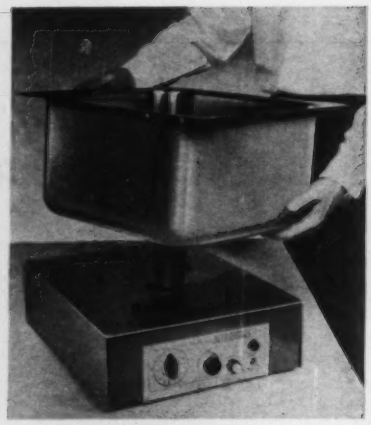


Boom movement is hydraulically controlled and permits 0.01 in. precision control of the hook in six directions of travel. The unit is available with hand pump, hydraulic boom actuation for explosion hazard areas.

For further information, *write* Vanguard Mfg. Co., 1908 E. 66th St., Cleveland 3, Ohio.

Ultrasonic Cleaner Can Use Several Tank Sizes

PRIMARILY a cleaning unit, the Blackstone Model SG-3 ultrasonic system can also be used for dissolving, blending, emulsifying, deaerating, and impregnating. The unit can use larger tanks than previous models.



Interchangeable tanks of 4, 5, and 8 gallon capacity are available. If increased sonic power density is desired, 1, 2, and 3 gallon tanks can be ordered.

The tank lifts off the stainless steel, covered housing without interrupting electrical connections. The low level drain (with screw cap) permits emptying the tank while in operating position.

The company says the transducer will not heat processing fluids when work is being done at low temperatures and maximum sonic output is provided even with fluids at 400° F.

For further information, *write* Blackstone Corp., Jamestown, N. Y.

Pyrometer Measures and Controls Temperatures

TEMPERATURES can be measured and controlled at distances up to 10,000 ft with an electronic pyrometer made by Metronix.

The transistorized unit, Model 600, operates on signals from a thermocouple. Due to the high input resistance of conventional, Metronix, direct current voltmeters, the company says the unit permits the use of thermocouples with extremely long lead lengths. The unit is chopper stabilized and requires no zero adjustment after it has been set at the factory.

For temperature measurement, the electronic pyrometer uses a single pointer panel meter. When temperature must also be controlled, the unit incorporates a locking contact meter relay with contacts mounted on one or two additional pointers. Temperatures may then be controlled at high or low limits or both.

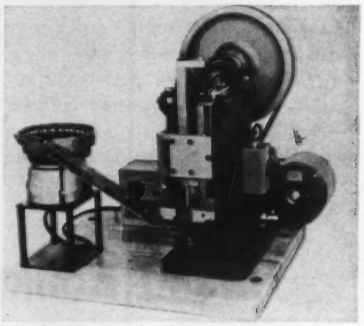
It's available in ranges with maximums of 300, 500, 750, 1000, 1500, 2000, 2500, and 3000° F. The company says accuracy is ±2 per cent of full scale deflection. It operates on 115 volts, 60 cycles, single phase.

For further information, *write* Metronix Inc., 75 Wilson Mills Rd., Chesterland, Ohio.

Riveting Machine Inserts, Sets Electronic Terminals

YOU CAN insert and set all makes of electronic terminals, base pins, and other parts at speeds in excess of 2000 per hour with the Etco Model 900 riveting machine, says the manufacturer.

It's ideally suited for setting electronic terminals in printed circuit boards and other electronic components. The unit is operated by an electric pedal. A vibratory hopper is employed to help insure continuous flow of the terminals to the riveting jaws. Electrically interlocked microswitches provide fail-safe operation.



For further information, *write* Eyelet Tool Co., 31 Carleton St., Cambridge 42, Mass.

Unit Can Dry, Cool, Roast Granular Compositions

GRANULAR solids can be processed in the Fluid-Flo dryer with a minimum of product loss or degradation, says Link-Belt. In addition, the unit can also be modified for cooling or roasting operations.

In the setup, material to be processed is fed over a housing and a constriction plate. Hot drying gases

where moisture
and abrasion
meet **brightness**
that never wears out

sink frames of

Superior

STAINLESS STRIP STEEL

At the toughest spot in the kitchen, Superior Stainless shows its metal best . . . the ever-bright, smooth gleam that asks no more than a wipe to reflect a housewife's pride. • Solid Superior stainless sink frames fabricate uniformly well because composition, dimensions and temper are uniformly as specified, every time. • We can serve you exactly as you wish. Ask us!

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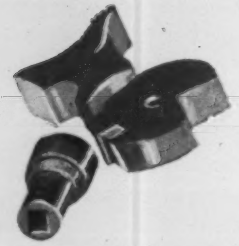
GEARS, KNOBS, TRIGGERS....

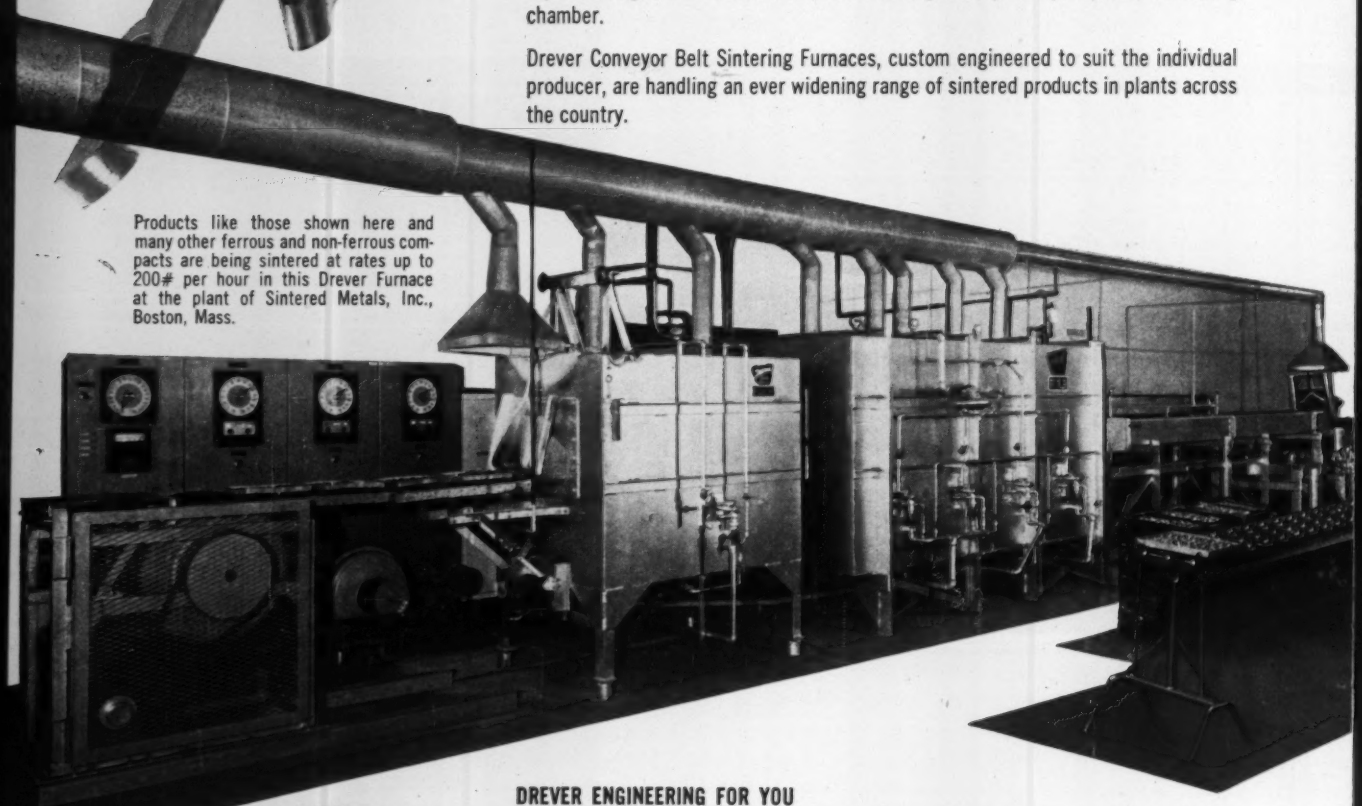


—AND A HOST OF OTHER POWDERED METAL PRODUCTS ARE CONTINUOUSLY PROCESSED IN CUSTOM ENGINEERED

DREVER SINTERING FURNACES

Sintering, the all important final step in producing metal products from compacted powder requires critical control of temperature and atmosphere if superior finish and dimensional stability are to be achieved. Drever Conveyor Belt Sintering Furnaces provide such control in continuous operation accommodating both ferrous and non-ferrous products. A separate burn-off chamber drives off the volatile lubricants and binders used in compacting thus avoiding the checking and cracking from rapid heating and at the same time maintaining atmospheric purity in the sintering chamber.

Drever Conveyor Belt Sintering Furnaces, custom engineered to suit the individual producer, are handling an ever widening range of sintered products in plants across the country.



Products like those shown here and many other ferrous and non-ferrous compacts are being sintered at rates up to 200# per hour in this Drever Furnace at the plant of Sintered Metals, Inc., Boston, Mass.

DREVER ENGINEERING FOR YOU

If you are interested in sintering, continuous or batch—or if you have other furnace processes in mind, consult with Drever engineers. They will apply a wide knowledge of the latest developments backed by long furnace engineering experience. Write or phone us. Drever Company, Bethayres, Pa. Phone: Wilson 7-3400.

DREVER INDUSTRIAL FURNACES

ENGINEERED TO YOUR PARTICULAR REQUIREMENTS

ENGINEERING AND MANUFACTURING FACILITIES AROUND THE WORLD THROUGH ASSOCIATES IN FRANCE, GREAT BRITAIN, GERMANY, ITALY, JAPAN AND INDIA

are pulled through the constriction plate, causing the material to be suspended in a fluidized mass above the plate. The suspended mass acts like a fluid and flows horizontally across the plate to the discharge chute. A motorized air lock in the discharge chute prevents loss of heat and maintains proper suction. Exhaust air is passed through a dust collector.

For further information, *write* Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

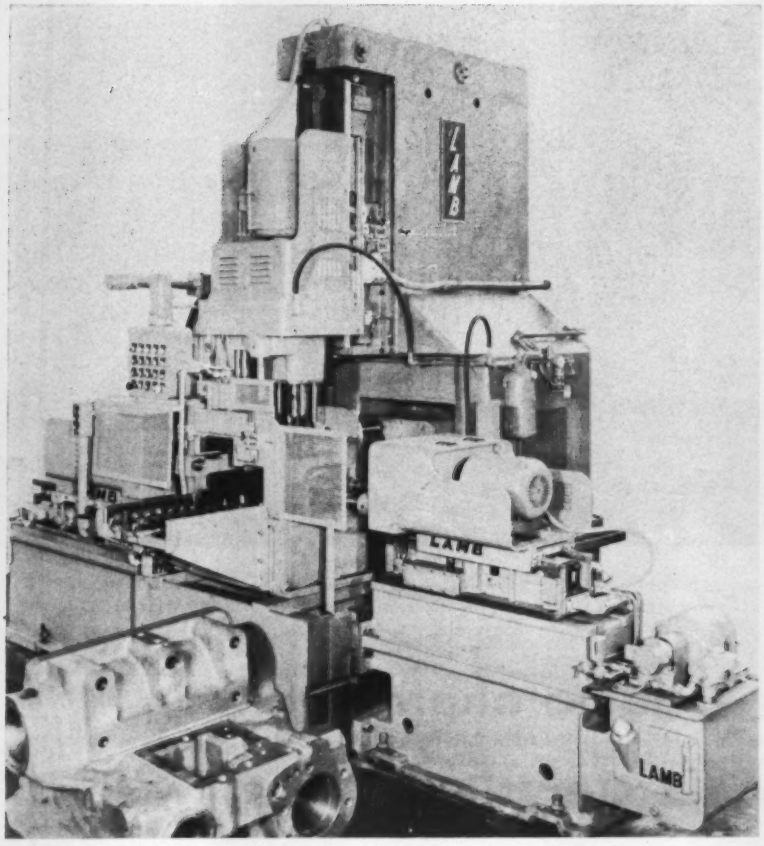
OBI Press Versatile, Has Improved Die Life

APPLICATION versatility, increased die life, safety extras, and rugged design are some of the features of the Havir, 125 ton OBI press.

The die area measures 30 x 44 in. with a proportionately large working area between the tierods. Shut height is standard at 17 in. with a 4 in. stroke.

The unit is available in air clutch flywheel or air clutch back geared models. It has a 28 in. opening in the back of the frame with an extra deep throat of 16 in.

For further information, *write* Havir Mfg. Co., 444 Cleveland Ave. S., St. Paul, Minn.



Four Way Unit Has Tunnel Column

A FOUR way drilling machine drills, spotfaces, chamfers, and forms valve seats. Low volume production of 32 cast iron, tractor power, lift housings per hour permits step feed, deep hole drilling. The unit has a tunnel column and carries a slide unit and straddles one of three horizontal slide units. Standard building blocks are used and the unit was designed for quick conversion. For further information, *write* F. Jos. Lamb Co., 5663 E. Nine Mile Rd., Detroit 34, Mich.

Narrow Lift Truck Handles 3000 lb

WAREHOUSES, light industries, and boxcar handlers are said to be the principal beneficiaries of the RST electric lift truck available in 2000, 2500, and 3000 lb capacities. It is only 33¾ in. wide.

With a 68 in. mast, the truck can stack loads 105 in. high and still retract enough to fit through low doorways, claims the maker. Mounted on three wheels, it can turn at a right angle to the load or front wheels. Such maneuverability is said to save 5 in. of aisle space.

For additional information, *write* Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill.

Proximity Limit Switch Circuitry Transistorized

METAL OBJECTS can be detected without contact by a proximity limit switch developed by GE. The unit can sense nonferrous materials up to ½ in. and ferrous material up to 1 in. away. The circuitry is all transistorized and contained in the operating head of the CR115 D switch.

Encapsulation protects internal components from coolants or contaminants—the sensing head will even operate under water. Maximum operating temperature: 150° F.

For further information, *write* General Purpose Control Dept., General Electric Co., Schenectady 5, N. Y.

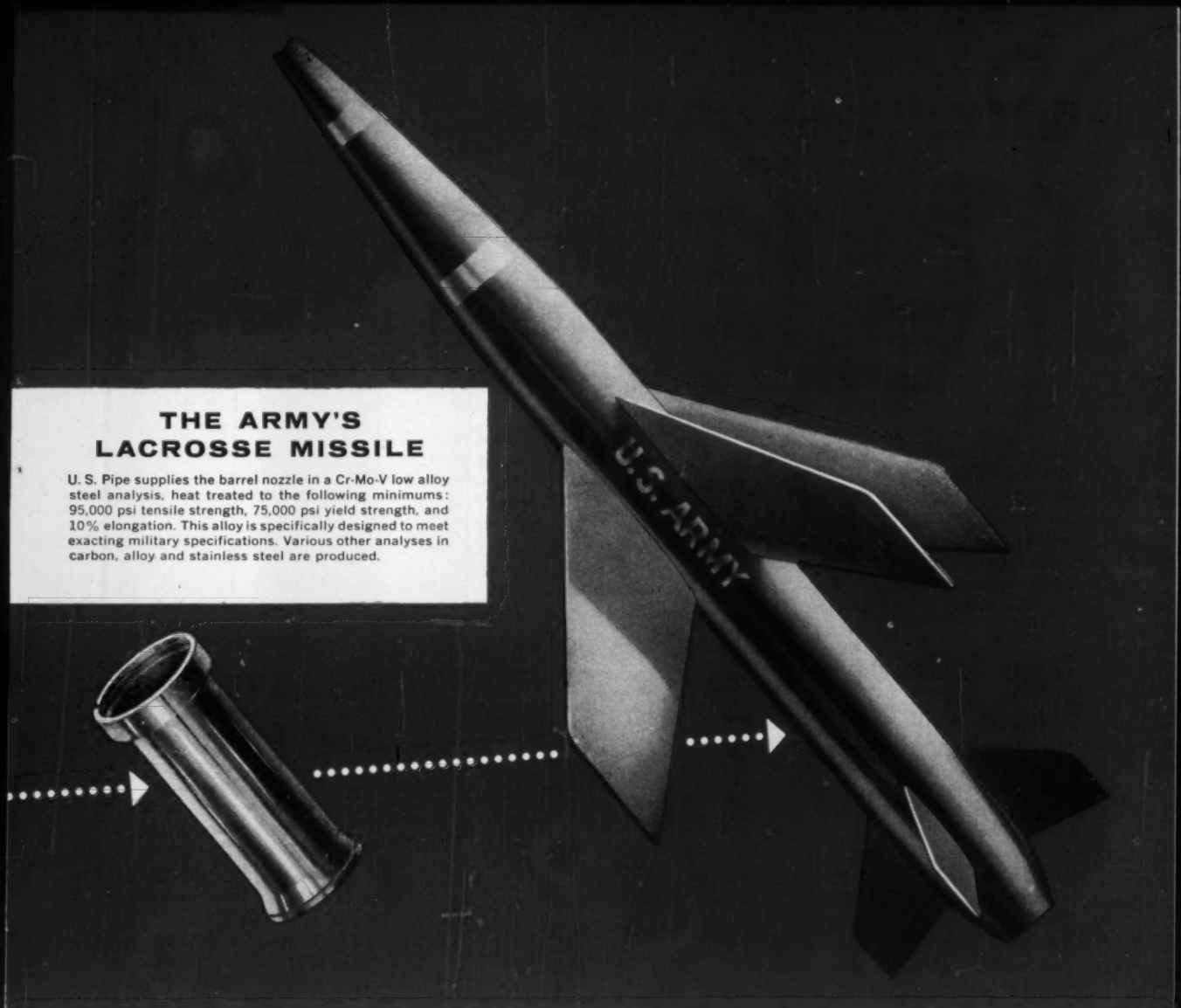
Photoelectric Light Ups Machine Operator Safety

A MODULATED, pulsing beam of light not only detects and warns an operator that his hand is in a danger area, it is unaffected by other lights in the operating area.

The unit consists of a light source,

Q. E. D.
DEPENDABILITY DEMONSTRATED

Now... basic characteristics of Metal Mold Centrifugal Casting contribute to the reliability of new Lacrosse Missile



THE ARMY'S LACROSSE MISSILE

U. S. Pipe supplies the barrel nozzle in a Cr-Mo-V low alloy steel analysis, heat treated to the following minimums: 95,000 psi tensile strength, 75,000 psi yield strength, and 10% elongation. This alloy is specifically designed to meet exacting military specifications. Various other analyses in carbon, alloy and stainless steel are produced.

Centrifugal casting, a direct production approach to quality, is now finding new and increasingly useful applications in rocketry and missile engineering.

U. S. Pipe, for example, supplies the alloy steel barrel nozzles for the Army's Lacrosse Missile as semi-finished, partially hot-forged lengths. These production pieces are being supplied to The Martin Company, Orlando, Florida — prime contractor for the Lacrosse, and to Parish Pressed Steel, Reading, Pennsylvania — subcontractor to The Martin Company. The contractors then finish machine them for assembly in the propulsion units.

Centrifugal casting offers ordnance design engineers several outstanding advantages:

1. Versatility. Many different alloy and stainless steel analyses, sizes and contours can be produced starting with a hollow billet.

2. Dependability. Years of experience in producing metal mold centrifugal castings assures high quality and reproducibility.

3. Economy. Maximum utilization of the *right* material produced with a minimum of processing to achieve overall efficiency.

Can these basic qualities meet the requirements and lower the cost of your material needs? Write today and outline your particular problem.

Size Range & Composition Flexibility
Outside Diameter—6" to 60" • Wall Thickness—⅜" and up
Length—Up to 25'
Types of Steel Cast, Carbon, Alloy and Stainless—all standard AISI and ACI grades.

UNITED STATES PIPE & FOUNDRY CO.

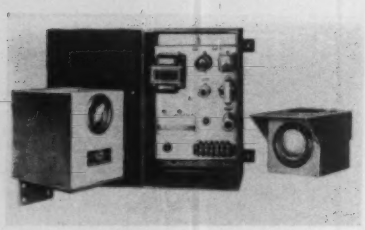
Steel and Tubes Division

STEEL & TUBES U.S. PIPE DIVISION

BURLINGTON, NEW JERSEY

SALES OFFICES: BURLINGTON, HARTFORD, BIRMINGHAM, CHICAGO, CLEVELAND, DALLAS, LOS ANGELES, NEW YORK, PITTSBURGH, SAN FRANCISCO

NEW PRODUCTS and equipment



a rotating disc pierced with a series of holes along its outer edge, a drive motor, and focusing lens. Motor speed is regulated to produce 540 pulses of light per second. The receiving unit is tuned to that frequency, effectively blocking out interfering light sources.

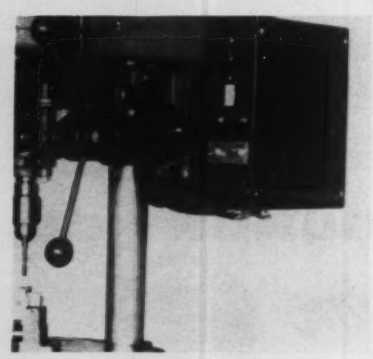
For further information, *write* Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio.

Tapper Attachment Fits Standard Drill Presses

AN AUTOMATIC spindle, reversing tapper unit converts standard drill presses to a tapper, drill press combination which can be used either way (by throwing a toggle switch).

The tapping device consists of an electrically interlocked reversing control panel which mounts on the right side of the drill press head, and a cam operated hand feed wheel with switching control. The unit makes possible the use of multiple spindle drill heads for multiple spindle tapping. Component mounting is quick and easy, says the company.

For accurate, quality threads, the unit provides directional synchronization of vertical spindle travel and tap rotation. When tapping, the handwheel control simultaneously reverses the direction of both the spindle feed and tap rotation.

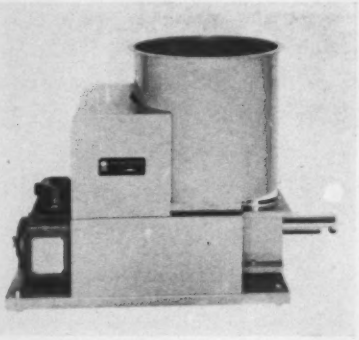


You can get special, high reversal motors for tapping cycles to 50 per minute in ratings of ¾ hp (1740 rpm) and 1 hp (1140 or 1600 rpm), 220 volts, three phase, 60 cycles.

For further information, *write* Power Control Products Inc., Vicksburg, Mich.

Vibrating Hopper Feeds Dry Materials Accurately

A FEEDING ACCURACY better than 1 per cent is claimed for a vibrating type of bin feeder equipped with a vibrated rotating screw. It is said to handle dry materials of widely varying characteristics without bridging or flooding.



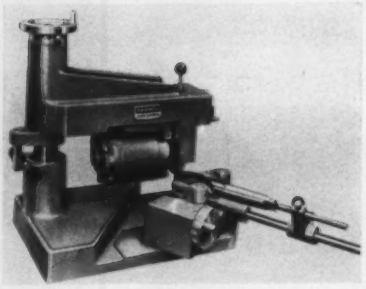
An integral, 3 cu ft hopper can be extended to 5 or 8 cu ft without loss of hoppering effectiveness. One basic machine is employed for all screw sizes. Feed rates run from 0.003 cu ft an hour for the ¼ in. size to 200 cu ft an hour for the 4 in. size.

For further information, *write* Vibra Screw Feeders Inc., 156 Huron Ave., Clifton, N. J.

Grinding Machine Thins, Centers Drill Points

IMPROVING THE cutting action of worn drills is made easier and more accurate by this drill point thinning machine. Bench mounted, it will handle ½ to 3 in. drills up to 24 in. long.

Drills are held at three points: Hardened jaws grasp the leading edges of the flutes just behind the cutting edges, and an adjustable



center fits the end of the shank. The system is said to leave the drill body free of chuck contact.

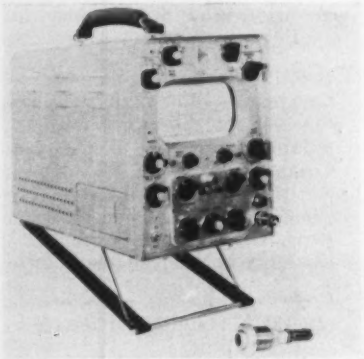
The machine grinds a groove of the proper depth on each side of the web. That reduces the length of the flat between cutting edges which has a tendency to thicken as the drill wears.

For further information, *write* Consolidated Tool Div., Farrel-Birmingham Co. Inc., 565 Blossom Rd., Rochester 10, N. Y.

Ultrasonic Flaw Detector Doesn't Require Fluids

AN ULTRASONIC flaw detector that doesn't require a fluid coupling has been developed by Circo. The unit, called Metalloradar, has a high degree of sensitivity that can be increased when necessary by a liquid coupling.

The ultrasonically vibrating crystal in the device is coupled to the object under test by a synthetic membrane which fits tightly over the transducer. The membrane also



protects the face of the transducer crystal against wear from friction with objects being tested.

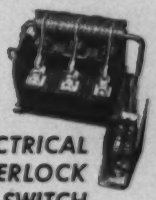
The company predicts the device will be most useful for testing objects that would be damaged by

(*Please turn to Page* 166)

All these Square D features make this

THE SAFEST, MOST RELIABLE COMBINATION STARTER

VISIBLE BLADES You can see the switch is open and know you're safe!



REALLY DUST-TIGHT

NEMA 5-12 construction keeps out dust and coolant. Positive door-closing mechanism assures complete seal before switch can be operated.

DOOR CLOSES SIMPLY and EASILY

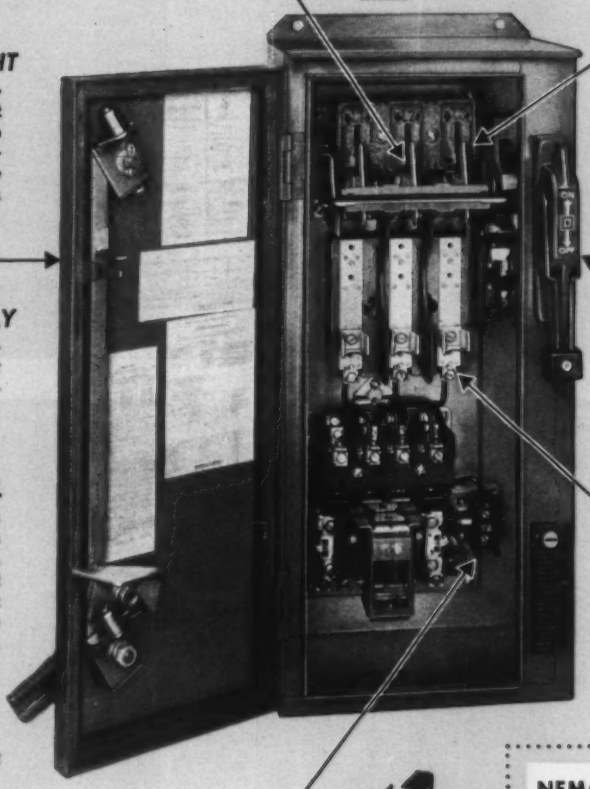
No cover bolts to secure—just push door shut and turn door handle to close and seal.

EASY TO INSTALL

Through wiring with no interference from disconnect switch. Line terminals are at top, load terminals at bottom. Starters can be ganged with less than ½ inch between them.

WIDE RANGE OF SIZES

New Square D combination starter now available in NEMA Sizes 0 through 4.



3rd OVERLOAD RELAY

Space to add an additional overload relay when desired.

ELECTRICAL INTERLOCK ON SWITCH

Optional single or double-pole interlock available to disconnect separate control circuit power. Assures complete safety!

FOOL-PROOF OPERATING MECHANISM

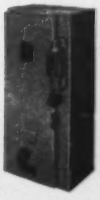
Handle is permanently attached to switch to eliminate hazard of false handle indication. With door open, the switch can not be operated accidentally.

CONVERTIBLE FUSE CLIPS

If horsepower or voltage requirements change, modification kits provide easy change of fuse clip size and spacing.

NEMA TYPE 1 ENCLOSURE ALSO AVAILABLE

NEMA Type 1 enclosures, offered in Sizes 0 through 4, can be modified by addition of a pushbutton, selector switch or other accessories. Easy-to-use kits simplify field installation.



Write for Bulletin SM-292. Address Square D Company, Dept. SA, 4041 North Richards Street, Milwaukee 12, Wis.

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wherever electricity is distributed and controlled

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WIRE

CF&I Spiders and Fibre Drums are packaged for your production

RETURNABLE SPIDERS

Here's the experience of one typical user:

> "When we used small coils, we lost several feet every time we changed a coil. Now, using CF&I Spiders, we have cut our waste 80%. We've also improved the quality of our end product because we don't have to reset the machine. CF&I Spiders have reduced our handling and storage problems, too, because you've got a lot of wire in one easy-to-handle package."

CF&I-Wickwire Returnable Spiders hold 2000 to 3000 lbs. of wire in one continuous length . . . consist of a center core welded to a heavy base plate. Available in two standard types from our mills—with core diameters of 18″ and 22″.

OPERATING ADVANTAGES: Increased production, decreased labor, less scrap loss, ease of handling and improved quality of end products.

FIBRE DRUMS

Here's what one satisfied user said about CF&I Fibre Drums:

> "They're an answer to the problem of unclean wire. The metal cover and locking band protect the wire from grime and other corrosive elements. The fact that they hold up to 600 lbs. of wire in one continuous length enables us to run our machines for a longer time than when we used small coils."

Fibre Drums hold 250 to 600 lbs. of wire in one continuous length . . . consist of a sturdy fibre container with center core, metal cover and locking band which protect the wire from atmosphere and dirt. The wire is directly withdrawn from the drum into your equipment. Available in full and half drums.

OPERATING ADVANTAGES:

- Cleaner wire, because the sealed drum protects the finish on the wire.
- Increased production, because of smooth pay-off and the fact that your machines have less downtime than with conventional coils.
- Less storage space required, because Fibre Drums can be stacked compactly on each other.
- Quick, easy handling . . . drums can be shipped strapped to a wooden pallet for convenient handling by a fork-lift truck.

ONLY CF&I OFFERS A TOTAL OF TEN DIFFERENT WIRE PACKAGES. You've just read how two of these packages have increased the production efficiency of leading manufacturers. One or more CF&I-Wickwire Wire packages can do the same for you. Our engineering staff will be happy to study your operation and recommend the type that best meets your requirements. For complete details, write your local CF&I sales office.

THE COLORADO FUEL AND IRON CORPORATION
Denver · Oakland · New York
Sales Offices in Key Cities

8137

(*Continued from Page* 162)

liquid immersion. Absorbent materials such as graphite and solid propellent fuels can be tested by the system. It can detect flaws from irregular surfaces such as bolt ends.

Another unit from Circo, called Microradar, measures thicknesses of materials by the pulse echo method. It can measure from 0.040 in. upward (in steel) consistently — with a readout accuracy of ±0.0004 in.

For further information, *write* Ultrasonic Div., Circo Corp., 51 Terminal Drive, Clark, N. J.

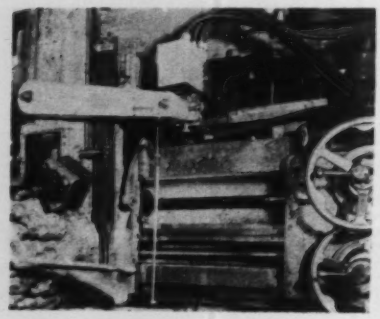
Tracer Control Attachment Doesn't Modify Machine

A TRACER control setup called Scan-O-Matic can be attached to any type machine that is screw feed or feed rod controlled (vertical turret lathes, engine lathes, milling machines, shapers, and planers). The unit is shown mounted on a 36 in., Bullard Cutmaster, vertical turret lathe.

The installation does not modify the machine in any way and converting from trace to normal machine operations is done in a few seconds. The maker says the unit can be quickly and easily installed.

A hydraulic co-ordinator valve meters fluid to the motors to produce a constant feed rate of the cutting tool over a workpiece throughout 180 or 270 degrees of travel. That includes both right-hand and lefthand, 90-degree straight walls.

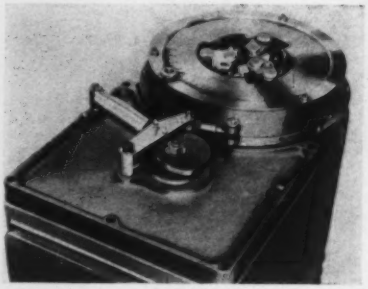
The spool of the co-ordinator valve oscillates 100 cycles per minute and results in a light stylus pressure and constant stylus deflection regardless of the amount of oil being metered to the hydraulic motors. Repetitive accuracy is assured: The valve will respond and repeat within 0.0002 in.



For further information, *write* Bansbach Machinery Co. Inc., 1037 Madison St., Oak Park, Ill.

Thread, Form Rolling Unit Produces at High Rates

HIGHER production rates are now possible with the Reed Model A22, three cylindrical, die thread and form rolling machine. A high speed, oscillating head makes possible production rates up to 60 pieces per minute.



A cam contour has been developed for smooth operation of the head at the higher rates of 50 to 60 cycles per minute.

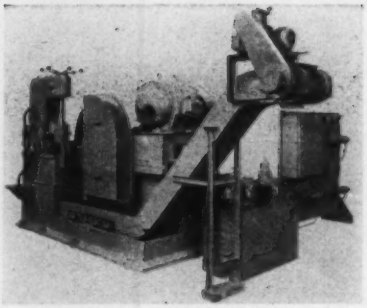
For further information, *write* Reed Rolled Thread Die Co., 791 Main St., Holden, Mass.

Saw Cuts Aluminum Billets

ALUMINUM billets from 4 to 12 in. in diameter can be cut with the Model No. AL1342 high speed saw. The saw is 42 in. in diameter and is propelled through a single gear reduction drive by a 75 hp motor at speeds from 1500 to 7500 fpm (surface speed).

Stock advance is hydraulically operated with automatic clamping. Replaceable nonmetallic liners are used. The saw is arranged for vapor mist coolant and is equipped with safety devices. A conveyor is provided for carrying chips away from the working area (see photo).

Other developments from Espen-Lucas include redesigned structural milling machines. Features include higher power (up to 40 hp), simplified controls, replaceable nonmetallic way wear plates, and ball screw lead screws. Several sizes are available.



For further information, *write* Espen-Lucas Machine Works, Front Street and Girard Avenue, Philadelphia 23, Pa.

Vacuum Furnace Features Convenience, Adaptability

EASE OF CONTROL and more operator efficiency are principal features of the Abar Series 90 vacuum furnace which operates up to 4700° F at pressures of 1 x 10^{-6}mm of mercury.

The furnace also has these features: The furnace is low enough to permit an operator to make all observations while standing on the floor; all instruments and controls are within 18 in. of the operator making observations; all controls are clearly identified on an illuminated control panel; the furnace is exposed on all sides so that auxiliary equipment can be easily added.

The furnace can be equipped with various combinations of pumping components, power supplies, hot zone sizes, heating elements, and radiation shields.

For further information, *write* Abar Corp., Hatboro, Pa.

Master Switches Offered

AN INDUCTION type master switch provides smooth, stepless speed control for industrial cranes, electric shovels, and other equipment using variable speed drives. It uses the variable output of a differential transformer and eliminates wear producing sliding parts.

The company says the switch permits extremely precise control

CONTINUOUS BAR MILL

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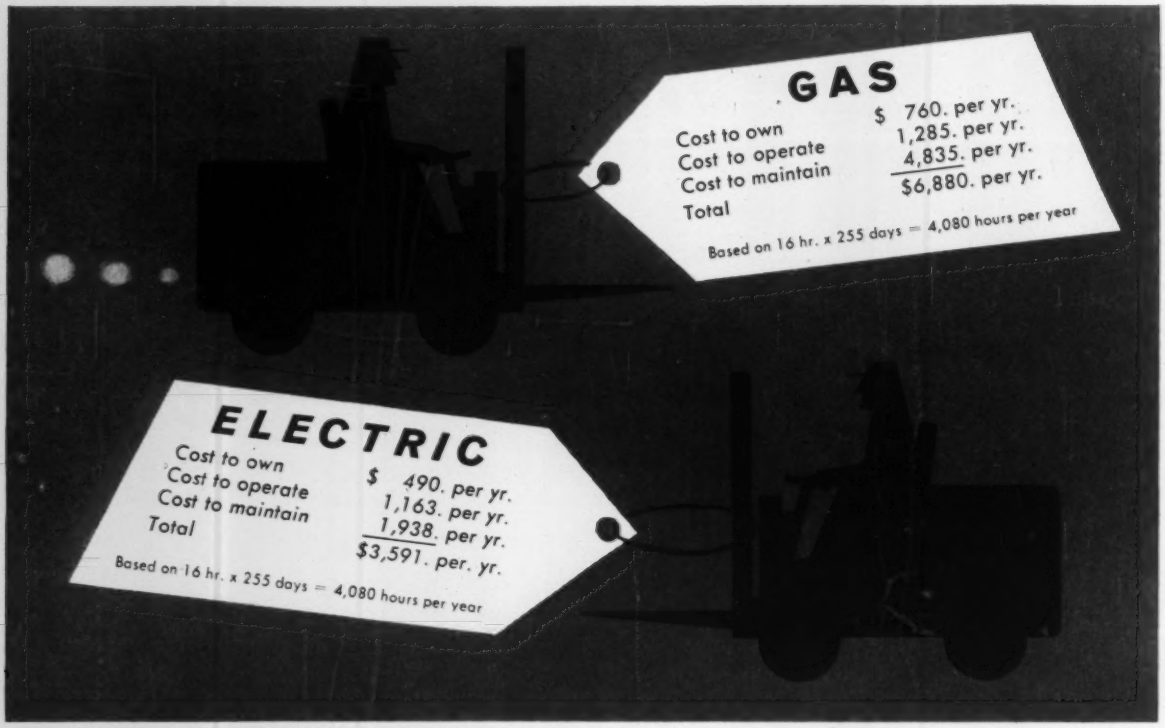
GAS
Cost to own $ 760. per yr.
Cost to operate 1,285. per yr.
Cost to maintain 4,835. per yr.
Total $6,880. per yr.
Based on 16 hr. x 255 days = 4,080 hours per year
ELECTRIC
Cost to own $ 490. per yr.
Cost to operate 1,163. per yr.
Cost to maintain 1,938. per yr.
Total $3,591. per. yr.
Based on 16 hr. x 255 days = 4,080 hours per year

What's The Real Price Tag?

An ELECTRIC TRUCK can save you over *$3,200 per year*

The real price tag to look at on an industrial truck is the *cost per year*, not the initial price.

When you consider that what you are actually buying is not the truck but the *total amount of work that the truck will deliver*, an electric has been proven to be the best buy.

Here are the reasons:

- Electric trucks have at least double the working life of gas powered trucks because their mechanism is much simpler. This lowers depreciation cost and means that ELECTRICS COST LESS TO OWN.
- During the past twenty years the price of gasoline has doubled while the cost of electric power has remained constant. As a result, ELECTRICS COST LESS TO OPERATE.
- Actual maintenance records in industry prove that ELECTRICS COST LESS TO MAINTAIN.

Send for free 12-page booklet which gives further information on this subject and includes calculator charts which make it easy to make cost comparisons on your specific industrial truck operation.

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for creeping speeds, greater spotting accuracy, and faster movement of loads. In low speed ranges, a large change in handle rotation provides a small output change. At high speeds, where fast response is desired, small changes in handle position provide a large change in output.

Another development, a joy stick master switch, permits simultaneous control of two motions with only one hand. The joy stick can be moved into any horizontal quadrant and into any position within the quadrant. Its neutral or off position is notched to give positive position feel. Both master switches can be desk, console, or pedestal mounted.

For further information, *write* Industry Control Dept., General Electric Co., Salem, Va.

Single Cutter Turner Saves Time on Jobs

THE automatic, single cutter turner with automatic tool relief for Gisholt's Masterline AR lathe is said to save time and cut costs on both production runs and small lot jobs.

Automatic, air operated, cam controlled tool relief, and automatic recocking after clearing the work permits the use of this unit on the AR lathes. All movable parts adjust for wear. Except for the base, all other components are interchangeable between the two sizes available for Models 4AR and 5AR lathes.

The unit is flange mounted and provides maximum metal removal with carbides while providing repeat accuracy and fine finish, says Gisholt.

The roller arms and rollers that are furnished with the standard No. 14119 and 15119B provide a turning range from $\frac{5}{8}$ to $2\frac{1}{2}$ in. A lower range of $\frac{1}{8}$ to $\frac{5}{8}$ in. can be obtained with an additional set of arms and rollers giving a combined range of $\frac{1}{8}$ to $2\frac{1}{2}$ in.

For further information, *write* Gisholt Machine Co., 1245 E. Washington Ave., Madison 10, Wis.

NEW Literature

Write directly to the company for a copy

Cost of Heat Treating

Work sheets for the computations of all costs involved in maintaining heat treating departments are contained in a booklet. Pittsburgh Commercial Heat Treating Co., 49th Street & A.V.R.R., Pittsburgh, Pa.

Electroplating Processes

Nineteen plating and other metal finishing processes and procedures are described in Bulletin EP-103. Solution preparation, type of deposits, operating conditions, equipment required, and applications are listed for each of the processes. Hanson-Van Winkle-Munning Co., Matawan, N. J.

Tool Steel Data

General characteristics and typical applications of three grades of Heppenstall steel (H44, B76, and 9C68) are given. Each sheet contains instructions for forging, annealing, hardening, and tempering. Heppenstall Co., 4620 Hatfield St., Pittsburgh 1, Pa.

Torque-Tension Manual

Design Manual No. 6101, 18 pages, includes 12 tables listing specific recommended installation torque values for thin and standard height, UNC and UNF, hex tvpe, elastic stop nuts. Elastic Stop Nut Corp. of America, 2330 Vauxhall Rd., Union, N. J.

X-Ray Microscopy

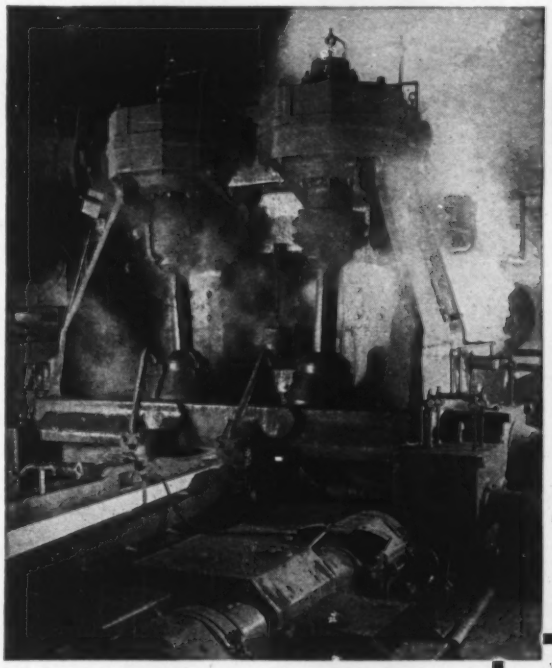
An eight page folder deals with problems of the x-ray microscope. Topics discussed include value of absorption coefficient ratio, analyzing pictures electronically and photographically, and instrument requirements. Philips Electronic Instruments, 750 S. Fulton Ave., Mt. Vernon, N. Y.

Ductile Vanadium

A brochure discusses new fabricating techniques for hot worked and cold worked ductile vanadium, including annealing range, extruding methods, machining, and welding. A table summarizes how cold working affects strengths in various conditions. Specify "Ductile Vanadium: Techniques That Make Fabrication Easier." Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

Ultrasonic Cleaning

Information on physical properties of most commonly used ultrasonic cleaning chemicals, suggested applications, working temperatures, and procedures is presented in a 14 page booklet. Ask for Bulletin S-700. Branson Instruments Inc., 40 Brown House Rd., Stamford, Conn.



Edging hot strip steel

No place for second-best equipment. That's why this heavy-duty vertical overdrive edger uses rugged Cone-Drive double-enveloping worm gearing to drive the vertical rolls continuously.

Rugged Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
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Red Circle Service for your rush orders means preferential handling from steel melting to finished processing. Your specifications are followed implicitly, with fast delivery as your bonus. This is possible through unique flexibility in scheduling and our personnel's cooperation and understanding of the urgency. When gaps appear in your coil or sheet inventory make sure you take advantage of this added feature. Specify Acme-Newport *Red Circle Service*.

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NEWPORT, KENTUCKY

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Hot Rolled Steel in Coil	Cold Rolled Steel in Coil (*full hard only*)	Plates (5/16" *and lighter*)
Hot Rolled Pickled Steel in Coil	Cold Rolled Sheets	Electrical Sheets
Hot Rolled Sheets	Alloy Sheets and Plates	Electric Weld Line Pipe
Hot Rolled Pickled Sheets		Spiral Welded Pipe

Recovery Gaining Momentum

THE UPTURN in steelmaking is gathering momentum and running slightly ahead of industry forecasts.

Production in the week ending Apr. 29 is expected to advance for the seventh consecutive time, topping the 1.8 million ingot tons that STEEL estimates the industry poured in the week ended Apr. 22. Output then was the highest of any week since the one ended May 28, 1960.

A few weeks ago, market analysts predicted that April steelmaking operations would average about 60 per cent of estimated 1961 capacity. But production has already crossed 62.5 per cent and seems certain to finish at least a point or two above the target. Look for the industry to pour 7.6 million ingot tons in April—8 per cent more than it produced in March and the most it has turned out in any month since May, 1960.

CONSUMPTION RISING— Steelmakers' decisions to relight open hearth furnaces that have long been idle reflect improved bookings and mounting backlogs. Case in point: One producer whose March shipments were up 20 per cent from the January-February average now expects a gain of 10 per cent in April. "And May looks strong," its sales vice president adds. Tin plate, galvanized sheets, reinforcing bars, and standard pipe are benefiting from seasonal uptrends in consumption. But users aren't increasing their inventories. They're depending on the mills to carry big stocks of ready-to-ship material. In the last few weeks, the stocks have been seriously depleted, so mills are stepping up their output in an effort to stay competitive on deliveries.

DELIVERIES LENGTHENING— In the East, the leadtime on tin plate is lengthening, and galvanized products are being quoted at six to ten weeks. In the Pittsburgh area, producers can still make off-the-shelf delivery of galvanized stock items, but they're quoting four to five weeks on material made to the buyer's specifications. Until recently, the leadtime was only three weeks. Cold rolled sheets are slightly tighter at three to five weeks, but hot rolled sheets can still be had in two.

FRB INDEX MOVING UP— How fast steel demand will accelerate in the months ahead will depend to a large extent on spending for consumer durables, plant, and equipment. The Federal Reserve Board's index of industrial production is one indicator that steel market analysts are watching closely. During the first quarter, it averaged 102 (1957 equals 100, seasonally adjusted) but the March figure was up almost 1 point from February's 101.6. April's FRB index is expected to be at least 103. Look for an average of 104 in the second quarter, 106 in the third, and 108 to 109 in the fourth. An index figure in the 108 to 110 range usually means that steel is being consumed at a rate equivalent to 70 per cent of the industry's shipping capacity. If that's the case in the fourth quarter and if consumers start building their inventories then, there's a good chance that October-December steelmaking operations will average 75 per cent of capacity.

FEDERAL AID FOR PIPE?— Line pipe producers are hopeful that the Kennedy administration's proposals for expediting Federal Power Commission clearance of gas transmission projects (see Page 101) will be adopted soon enough to give their 1961 shipments a boost. The 7017 miles of pipeline awaiting FPC approval may require up to 1.4 million tons of large diameter pipe.

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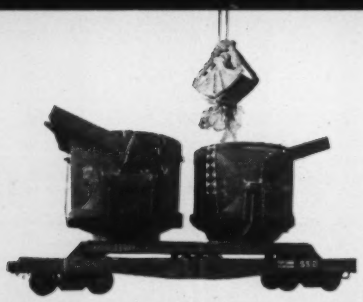
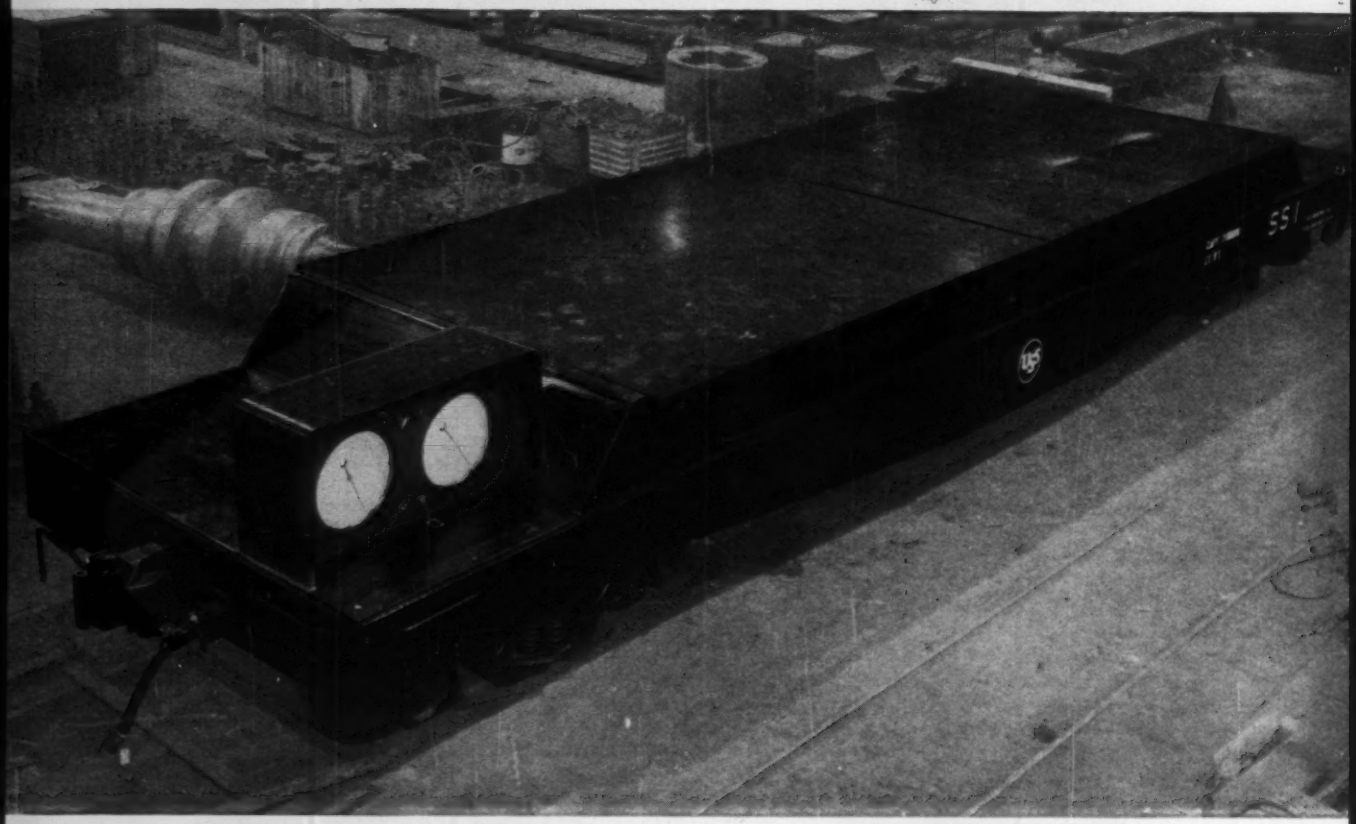
*Current prices were published in the Apr. 17 issue and will appear in subsequent issues.



This mark tells you a product is made of modern, dependable Steel.

this car is a traveling all-purpose weigh platform



At McLouth Steel, stainless scrap is loaded and weighed to within two-tenths of one percent accuracy. This double operation, performed right in the yard, cuts handling time in the mill and gives them better control of charging mixtures.

Weigh anything up to 100 tons, anywhere on the track, with this new, all-purpose weigh car. It can handle one 100-ton load or two 50-ton loads to within two-tenths of one percent accuracy. You can use it anywhere because the load cells are hydraulically operated and need no power. A weigh car pays for itself by eliminating guesswork and human error.

The McLouth Steel Corporation, Detroit, Michigan, uses this weigh car to predetermine the exact weight of stainless steel scrap and other expensive alloying ingredients. They cut handling time because weighing is done right in the yard. Weight records give them better control of inventory and charging mixtures and make it easier to find the yield cost. Other steel producers cut costs by weighing electric furnace charges and products to control yields. This all-welded, stress-relieved steel car will stand up in all of these uses and give long, dependable service.

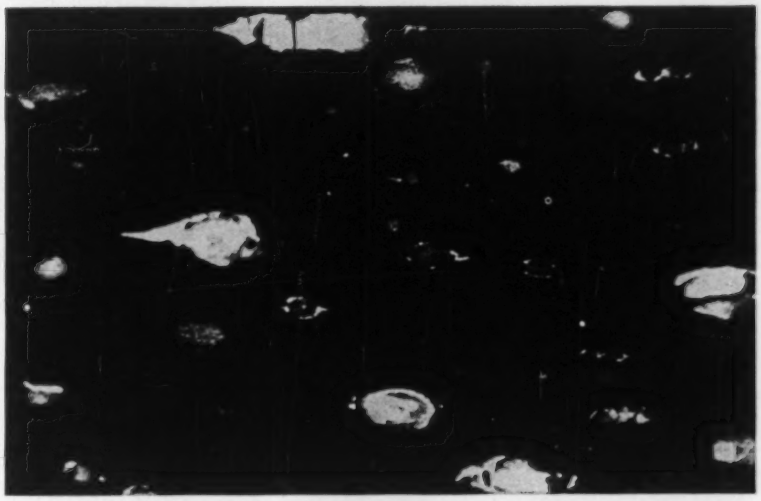
USS Weigh Cars and other industrial cars are built to last by United States Steel, a company that also *uses* them! We can custom design and build any type weigh car to best suit your needs. Send your weight problems to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. United States Steel Corporation, Pittsburgh · Columbia-Geneva Steel, San Francisco · Tennessee Coal & Iron, Fairfield, Alabama · United States Steel Export Company

USS TRADEMARK

United States Steel

New Steel Boosts Machinability

Addition of tellurium is key to superior qualities reported for free machining material being produced in experimental lots by Inland Steel Co.



Teardrop shape of sulfide inclusions in Inland Steel Co.'s tellurium-bearing steel is believed to contribute to high machinability ratings of this new material

• A TELLURIUM - BEARING steel that dramatically speeds up machining is being made in experimental lots by Inland Steel Co., Chicago.

In one test, cold drawn, 13/16 in. hexagon bars were machined into sparkplug shells on a six spindle, automatic screw machine. STEEL was told that the machine was run at top spindle speed, producing about 600 surface feet a minute.

Cycle time was about half that of similar tests on a free cutting, AISI C-12L14 steel containing lead. So in this case, machine output was about doubled.

Tool life and finish were said to be excellent, despite the high speeds used in the tests.

Hot rolled bar stock which was processed by cold drawers is being put through machinability tests at several places.

• The steel is an outgrowth of leaded steels which the company pioneered. Lead is also an important constituent of the new material.

Addition of tellurium to the steel is reported to give its sulfide inclusions the shape and distribution considered most desirable for optimum machinability.

Inland Steel does not have a price structure for the steel. And it has not revealed how much tellurium it is adding, or how it is making the additions.

The tellurium metal price is $3.50 to $5 a pound.

One of the rarer elements, tellurium has chemical and physical properties similar to those of selenium and sulfur. The metal (see STEEL, Oct. 10, 1960, p. 221) is obtained as a byproduct of copper and lead refining. It is also present in gold ores—and seriously handicaps gold recovery. The principal copper operations in the West and Canada are the major world sources of tellurium.

Line of Vacuum Cast Forgings Expanded

BETHLEHEM Steel Co. is expanding its line of products forged from vacuum cast steel ingots.

Additions: All steam turbine rotor and spindle forgings and turbine powered, electric generator, shaft forgings.

Since August, 1956, Bethlehem has been producing all hardened steel rolls from vacuum cast ingots.

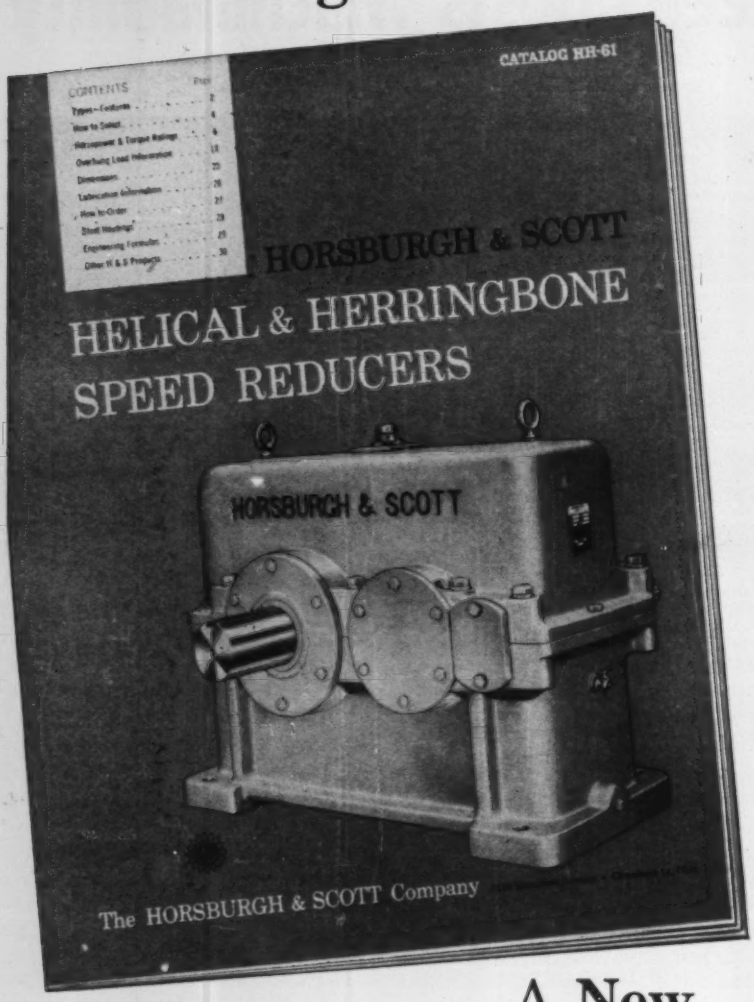
No price increase accompanied the switch to vacuum steel in the rolls, nor in the latest additions.

Vacuum casting reduces the volume of hydrogen and other gases throughout an ingot cross section to a harmlessly low level, Bethlehem explains. As a result, large press forgings now can be made from sounder, tougher, and cleaner ingots with the possibility of flaking or microcracking practically eliminated, the company says. Removal of hydrogen in the vacuum pour also greatly minimizes embrittlement tendencies in larger forgings.

Demand for press forgings of vacuum cast steel has necessitated the doubling of the size of Bethlehem's equipment for such products. Two additional vacuum degassing chambers have been installed. They can produce ingots 120 in. in diameter and weighing 535,000 lb.

Bethlehem operates five vacuum degassing chambers capable of servicing electric furnaces producing ingots weighing from about 7 to nearly 270 tons.

Introducing . . .



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SPEED REDUCER CATALOG

To Simplify Selection of Speed Reducers for Industry

New catalog features include:

New Sizes • Improved Ratings • More Ratios • Latest AGMA Thermal Ratings • Simplified Selection • Easy-to-use Overhung Load Ratings • Steel Housings.

Write for **Catalog HH-61**—on your company letterhead, please.

Let our engineering staff give you prompt assistance with your enclosed gearing requirements.

H&S

The HORSBURGH & SCOTT Co.
5112 Hamilton Avenue • Cleveland 14, Ohio

Miniature Ball Bearing Prices Are Reduced

Prices have been reduced 3 to 7 per cent on precision miniature ball bearings made by New Hampshire Ball Bearings Inc., Peterborough, N. H. The prices apply to catalog items ordered in production quantities. Price additives on some items of advanced design were eliminated. The last general price increase in the industry was in 1953.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 183 & 184

Demand for light flat rolled steel products is seasonally heavier, being stimulated by automotive requirements and heavier buying for such miscellaneous lines as shipping drums, domestic fuel oil tanks, furnaces, and construction. Active demand from slitters is reported, especially those selling to makers of box strapping. Also, there's been a pickup in conduit work, and the service centers are ordering a little more actively.

Delivery promises are tightening a little, especially galvanized sheets. The mills are quoting four to five weeks on galvanized, three to five on cold rolled (where processing is required it's nearer six weeks), two to three weeks on hot rolled.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 183

The seasonal rise in construction is reflected in increased pressure for reinforcing steel shipments. Highway, bridge, and other types of construction projects are moving forward rapidly. Result: Rebar mills are stepping up production, some being engaged at about 70 per cent of capacity.

Steel Bars . . .

Bar Prices, Page 182

There appears to be a little more life in the steel bar market, though demand continues spotty. The service centers are ordering more tonnage, and better inquiry is being received by the mills from agricultural implement builders. Automotive tonnage is also up a trifle. However, the railroads and makers of fasteners and small tools are continuing to specify lightly. General

purpose industrial equipment needs continue to lag. This is particularly affecting demand for cold drawn bars.

Tin Plate . . .

Tin Plate Prices, Page 184

The tin plate market is tightening noticeably. There has been no extension of deliveries to the big can companies (because they order so far ahead), but smaller users must wait at least five weeks for deliveries. Demand for thin tin plate is running ahead of expectations. Only a few customers are using it, but they want all they can get, and the mills are pressing production.

Plates . . .

Plate Prices, Page 183

Absence of important buying of plates by the railroads, shipbuilders, and oil refiners continues. But construction requirements are heavier and demand from the chemical industry and manufacturers of food processing equipment is fairly strong. Defense requirements have leveled off. For the most part, Naval shipyard tonnage for second quarter has been placed. Some new pipeline business is in prospect.

Alan Wood Steel Co., Conshohocken, Pa., plans to get its new, 96 in., plate mill in operation by mid-August. Rated annual capacity is around 480,000 tons. It will replace the present 189,000 ton, 84 in. mill. It will roll plate up to 4 in. thick.

Structural Shapes . . .

Structural Shape Prices, Page 182

While the delivery spread on structural shapes remains at two to four weeks, earlier rollings are more difficult to get with demand for structurals increasing. Most of the new work developing is of a public nature, notably highway construction. However, some private jobs are before the market, and fabricating shops are estimating a fairly diversified volume of work. Considerable bridge tonnage is being figured, including three medium sized, built-up plate girder structures in New England.

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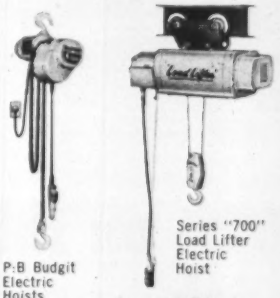
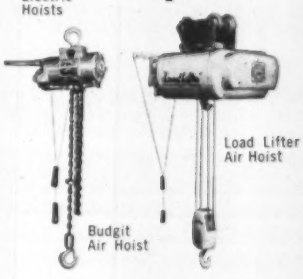
2✓ AIR HOISTS to lift fast where atmosphere conditions are hazardous, corrosive, extremely hot, dirty or wet

3✓ CHAIN BLOCKS for easy lifting where the work cycle is moderate



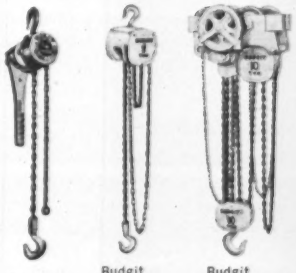
P:B Budgit Electric Hoists

Series "700" Load Lifter Electric Hoist



Budgit Air Hoist

Load Lifter Air Hoist



Tugit

Budgit Aluminum Chain Block

Budgit Army Type Chain Block

ELECTRIC HOISTS

P:B Budgit® Electric Hoists. 1/8 to 2 tons. Modern push-button hoists for regular service. Portable. Two fully enclosed automatic brakes. Spotting action is fast, accurate. 1/2-ton load can be lifted at 34 FPM. Hook suspension. Trolleys available. Standard models for intermittent service — AC, DC, and 12-volt battery types — have pull cord control.

Load Lifter® Electric Hoists. 1/2 to 15 tons. For heavy-duty and production line service. Safe 24-volts at the push button. Single and 2-speed control. A ton can be lifted at 60 FPM. Two automatic brakes. Types for lug or hook suspension; also with push, hand-geared or motor-driven trolley. Hi-hook model increases length of lift.

AIR HOISTS

Budgit® Air Hoists. 1/4, 1/2 and 1 ton. Compact, lightweight hoists for regular lifting service. Link and roller chain types. Explosion proof motor. Spark and corrosion resistant link chain models. Speeds infinitely variable to 75 FPM. Pull cord control. Safety hooks standard. Rigid mount type and push trolley available.

Load Lifter® Air Hoists. 1 to 15 tons. Wire rope type for heavy-duty service. Five cylinder motor for smooth operation at all speeds. Speed infinitely variable to 37 FPM. Pull cord control standard; throttle control available. Mechanical load brake adjusts itself. Lug, push trolley, and hand-geared trolley suspension.

CHAIN BLOCKS

Tugit® . . . the Lever-Operated Hoist. 3/4 to 3 tons. Light. Compact. Portable. Operates easily at any angle even in close quarters. Has countless uses in every industry. Spur-geared for highest efficiency. A 42-lb. pull on the handle lifts 2 tons. Spark and corrosion resistant models.

Budgit® Chain Blocks. 1/4 to 10 tons. For production or maintenance. Combine light, strong aluminum frame with spur-geared lifting and automatic load brake. 25 lb. pull on hand chain lifts 1/4 ton. Hook suspension standard. Trolleys available. Army-type Budgit has integral trolley that can be adjusted to fit several sizes of I-beams and permits high hook lift. Ask about spark and corrosion resistant models.

SOLVE YOUR LIFTING PROBLEMS. Call your nearby Shaw-Box Distributor for practical help in selecting the best type of overhead load handling equipment — hoist or crane — for each task. Or, write us for literature.

MANNING MAXWELL & MOORE INC. M&M TRADE MARK

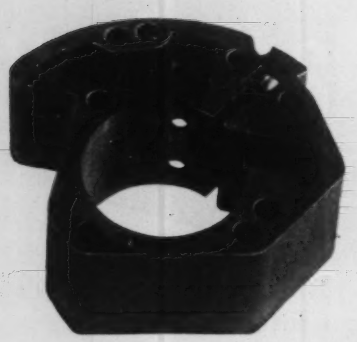
OVERHEAD LOAD HANDLING EQUIPMENT

Products of

MANNING, MAXWELL & MOORE, INC.

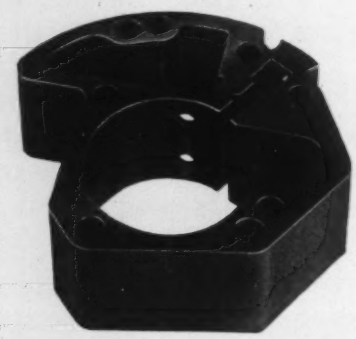
Shaw-Box Crane & Hoist Division • Muskegon, Michigan

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario.



BEFORE BRUSHING

Corners of intricate multiple contours were hand-filed to remove burrs. Results were inconsistent. Former production rate: **24** *per hour.*



AFTER BRUSHING

All surface junctures are blended accurately to predetermined specifications. Results are uniform...quality is high. Osborn 3-A Machine production rate: **63** *per hour.*

Production up 162% on this finishing job

...with OSBORN power brushing

PUSH-BUTTON FINISHING OPERATION . . . *with Osborn 3-A Machine using Osborn Economy® Wire Brushes. Operator simply loads part...starts pre-set brushing cycle... and unloads part after brushing.*

Formerly, this air conditioner manufacturer finished 24 compressor bodies per hour. He now finishes 63 per hour...*a 162% increase in production.* But that's just the start.

Quality now is uniform because Osborn power brushing thoroughly removes all burrs that might ultimately damage the compressor. Each surface juncture of the intricate contour is also formed to an exacting, predetermined blend . . . all automatically.

Your **Osborn Brushing Analyst** will gladly provide complete details. He will show how you can benefit on similar operations in your own plant.

Write now for full details on Osborn Metal Finishing Machines. *The Osborn Manufacturing Company, Department S-34, Cleveland 14, Ohio.*

VISIT OUR BOOTH '61 METAL FINISHING EXPOSITION MAY 22-26

Booth 2407

OSBORN

Metal Finishing Machines...and Methods • Industrial Brushes • Foundry Production Machinery

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2260 tons, office building, Denver, for Western Savings & Loan Association, to Burkhardt Steel Co., Denver.

700 tons, Leonard Polis Apartment, Philadelphia, through Bornstein & Son, general contractor, to Robinson Steel Co., Lansdale, Pa.

690 tons, tower footings, etc., government furnished, Ice Harbor-Franklin transmission line, Washington State; general contract to Bay Construction Co., Seattle, at $234,782 by Bonneville Power Administration, Portland, Oreg.

665 tons, state highway structures, including 11-span beam and plate girder, also grade separation, Albany County, New York, to Standard Structural Steel Co., Hartford, Conn.; Coleman Bros. Corp., Readville, Mass., general contractor.

650 tons, Riddle Memorial Hospital, Media, Pa., to Keystone Structural Steel Co., Trenton, N. J.

451 tons, bridge, Sec. 102 HF, Tazewell County, Ill., for State of Illinois, to Vierling Steel Works, Chicago.

374 tons, angles, Military Industrial Supply Agency, Navy, Philadelphia, to Caine Steel Co., Philadelphia.

203 tons, angles, Military Industrial Supply Agency, Philadelphia, to Knoxville Iron Co., Knoxville, Tenn.

200 tons, including concrete reinforcing bars, high school, Ludlow, Mass., to Haarmann Steel Co., Holyoke, Mass. (structurals) and Scherer Steel Co., East Hartford, Conn. (reinforcing bars); E. J. Pinney Co. Inc., Springfield, Mass., general contractor.

STRUCTURAL STEEL PENDING

2500 tons, Morrison bridge interchange, Portland, Oreg.; J. W. Conley and Hannan Bros., Portland, low joint bidders at $2,519,846 to Oregon Highway Commission.

1749 tons, state highway bridge, Passagassawaukeag River, U. S. Rte. 1, Belfast, Maine; bids May 10, Augusta, Maine; also, 480 tons of concrete reinforcing bars, and 605 tons of H-beam piles.

1630 tons, Yellowtail Dam project, Bighorn County, Montana; Morrison-Knudsen Co., Boise, Idaho, apparently low, jointly with four other firms, $39,809,359 to the U. S. Bureau of Reclamation.

1200 tons, Oregon State traffic structures, Medford, Oreg.; R. A. Heintz Construction Co., Portland, Oreg., low at $2,408,958.

800 tons, hospital addition, White Haven, Pa.; bids May 10.

325 tons, one 5-span and one 3-span composite wide flange beam bridges, Derby, Vt.; bids May 12, Montpelier, Vt.; also, 128 tons of reinforcing bars.

275 tons, grain shipping gallery, Port of Tacoma, Wash.; Baugh Construction Co., Seattle, apparently low at $710,169.

175 tons, one four-span, composite, wide flange beam bridge, South Burlington, Vt.; bids May 5 to Montpelier, Vt.; also, 76 tons of concrete reinforcing bars.

150 tons, Hanford Works pumphouse; Sound Construction & Engineering Co., Seattle, low at $1,426,983 to Kaiser Engineers, prime contractor.

150 tons, also 66 tons of concrete reinforcing bars, steel beam bridge, Manchester-Auburn, N. H.; R. G. Watkins & Son Inc., Amesbury, Mass., is low on the general contract.

143 tons, two, three span, composite, wide flange beam bridges, Williston, Vt.; Lane Construction Co., Meriden, Conn., low on general contract; also required, 65 tons of reinforcing bars.

143 tons, state highway bridge, Contract 2, Richmond-Williston, Vt.; Landers & Griffin Inc., Portsmouth, N. H., low; also, 1400 linear feet of steel piles, and 65 tons of concrete reinforcing bars.

135 tons, grade separations at Rhode Island Avenue and T Street, Washington, D. C.; also, 650 tons of concrete reinforcing bars.

103 tons, state highway work, FINIE 61-3, Niagara County, New York; Depew Paving Co. low on general contract.

REINFORCING BARS . . .

REINFORCING BARS PLACED

4790 tons, Washington State, Seattle freeway

section to Pacific Coast Div., Bethlehem Steel Co., Seattle; also, unstated reinforcing steel tonnage for concrete piling, to Hart Construction Co., Tacoma, Wash.; Sound Construction & Engineering Co., Seattle, general contractor at $5,548,329.

530 tons, administration and storage buildings, Ft. Devens, Ayer, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Wexler Construction Co., Newton Highlands, Mass., general contractor; 80 tons of fabricated structurals went to American Architectural Iron Co., Boston.

400 tons, Hanford Works pumping plant, to Mercer Steel Co., Portland, Oreg.

335 tons, guide wall, Ice Harbor Dam project, to unstated interest; General Construction Co., Portland, Oreg., is general contractor.

190 tons, state highway bridges, Albany County, New York, to Sweets Steel Co., Williamsport, Pa.; Colman Bros. Corp., Readville, Mass., general contractor.

138 tons, eight span, international bridge, Lubec, Maine-Campobello Island, N. B., to York Steel Co.; Callahan Bros. Inc., Mechanic Falls, Maine, general contractor; also required, 206 tons of steel piles, placed with Bethlehem Steel Co., Bethlehem, Pa.

109 tons, state highway bridge, Route 122, Northbridge-Uxbridge, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Macon Construction & Engineering Co. Inc., Attleboro, Mass., general contractor; also, 66 tons of fabricated structurals to City Iron Works, Hartford, Conn.

105 tons, Montana state highway project, Cascade County, to Pacific Coast Div., Bethlehem Steel Co., Seattle.

REINFORCING BARS PENDING

3240 tons, Yellowtail Dam project, Montana; bids in to the U. S. Bureau of Reclamation, Hardin, Mont.

500 tons or more, Oregon State, 3222 ft highway viaduct, Medford; Peter Kiewit Sons Co. Inc., Vancouver, Wash., low at $1,675,788.

232 tons, Idaho state underpass and twin bridges, Bonner County; bids to Boise, Idaho, Apr. 25.

230 tons, also shapes, four highway spans, Bonneville-Jefferson counties; bids to Boise, Idaho, May 9.

220 tons, Washington State box girder span, Lewis County; bids to Olympia, Wash., Apr. 25.

165 tons, offramp Alaska Way viaduct, Seattle; Willar Construction Co., Seattle, low at $276,684.

150 tons, Washington State box girder span, King County; bids to Olympia, Wash., Apr. 25.

125 tons, Washington State highway paving, Grays Harbor County; bids to Olympia, Wash., Apr. 25.

PLATES . . .

PLATES PLACED

500 tons or more, also shapes, 27,000 ton Swan Island floating drydock for Port of Portland, Oreg.; general contract to Gunderson Bros. Engineering Co., Portland, Oreg., at $4,940,400.

100 tons plus, fuel storage tank, Glasgow (Montana) Air Base, to Power Engineers Inc., Twin Falls, Idaho, at $100,530 by U. S. Engineer.

PLATES PENDING

3000 tons of sheet steel piling, government furnished; cofferdam for first phase of lower Monumental Dam, Snake River, Wash.; bids to U. S. Engineer, Walla Walla, Wash., about May 17.

1400 tons, 7 mile, 28 in. diameter, ¼ in. steel water supply line; bids to Aberdeen, Wash., Apr. 26; also alternatives.

425 tons, two, 5 million gallon capacity, water tanks; bids Apr. 25, Littleton, Colo.; alternates on prestressed concrete.

245 tons, carbon, Type 11, Class 1, bids Apr. 24, Military Industrial Supply Ofice, Navy, Philadelphia; also 23 tons of stainless steel sheets.

169 tons, floor plate, Military Industrial Supply Agency, Navy, Philadelphia; bids May 1; also, 345 tons of carbon steel sheets, same date.

beautiful products

from

CONTINENTAL® WIRE

EXAMPLE
FIREPLACE CURTAIN SCREEN WIRE

The beauty and smooth operation of fireplace curtain screens depend on accurate forming, even spacing, and neat appearance of the mesh. The wire used must be of correct temper, diameter and finish. Uniformity of these properties is of prime importance. Leading fireplace equipment makers choose Continental Wire because it possesses these features dependably, in coil after coil. The ability to take intricate forming is an important reason why Continental Wire is specified for scores and scores of other products made with wire. Continental Curtain Screen wire, 19 gauge through 20 gauge inclusive in size, is available in 500 pound to 650 pound catchweight single length coils packed in Leverpac Drums for faster weaving with less down time, cleaner handling and better storage. For wire in practically any size, finish, temper or analysis, in low or medium low carbon steels, see Continental first!

Fine Finishes in Manufacturers' Wire

CONTINENTAL STEEL
CORPORATION

KOKOMO • INDIANA

PRODUCERS OF: Manufacturers' Wire in many sizes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright and special shaped wire. Also Welded Wire Reinforcing Fabric Nails, Continental Chain Link Fence, and other products.

Service Center Bookings Gaining

STEEL SERVICE CENTER operators anticipate continued upswing in order volume this quarter, following the 10 per cent increase in tonnage reported for the first quarter. Sales are still on a moderate level, but with consumers' stocks at a low point, it's expected individual orders will increase both in number and in size over coming weeks.

Speaking at a meeting of the Southern Chapter of the Steel Service Center Institute, meeting in Birmingham, Robert G. Welch, executive vice president of the organization, said that the percentage increase in service center shipments in the Southern States in the first quarter of this year was slightly less than in the rest of the nation. Reason: Fourth quarter (1960) sales in the area did not show as large a decline as in other regions.

• **Stocks Depleted**—Mr. Welch said it was his opinion that the improvement in service center sales is due largely to the depleted state of consumer inventories. In fact, he declared, inventories of steel in many plants are so low many users are back in the market for the first time in months.

"Our industry is processing an extremely large number of orders," said Mr. Welch, "but the average order size is quite small, indicating hand-to-mouth buying. This factor, together with customer requirements for fast delivery, special packaging, test reports, close tolerances, and similar special services, has substantially increased costs, making tight cost controls more imperative than ever in the industry. That situation always exists in a competitive market such as today's."

(*Please turn to Page* 180)

Galvanized Sheet Shipments Set Record in 1960

SHIPMENTS of galvanized steel sheets in 1960 registered a gain of 10 per cent over the movement in 1959, reaching a record 3,056,996 net tons, reports the Committee of Galvanized Sheet Producers.

The report, based on data collected by the American Iron & Steel Institute, showed the automotive industry continued to increase its consumption; direct shipments for auto use amounted to 218,964 net tons, up 38 per cent from shipments in 1959.

That increase, says the Committee, reflects the increasing recognition of the values of corrosion resistance, strength, and economy of galvanized sheets in auto manufacture. The average 1961 model uses well over 100 lb of galvanized sheets.

• **Increases Shown** — Direct shipments to the air conditioning and ventilating industry also continued to rise. They were more than 18 per cent above 1959's total.

The Committee emphasized that the total of 148,918 net tons shipped in this market represents only direct mill shipments for use in commercial and industrial air conditioning.

• **Record Tonnage**—Service centers and distributors during the year took a record tonnage (974,365), an increase of 16 per cent over the previous year's intake. There was also a rise of more than 14 per cent in direct mill shipments to the construction industry.

Some decrease was noted in direct mill shipments to agricultural applications; net tonnage dropped to 129,005 tons from 186,641 in 1959.

Demand for galvanized sheets for appliances, utensils, and cutlery remained strong last year; shipments hit 149,100 net tons, a 24 per cent increase over 1959's.

Steel Product Shipments by Markets — February, 1961

(Carbon, alloy, stainless; net tons)

Markets	February 1961	February 1960	First Two Months 1961	First Two Months 1960
Converting, Processing	174,399	345,046	341,526	739,477
Forgings (except auto)	56,254	107,804	110,580	224,405
Fasteners	63,188	134,789	131,614	280,169
Distributors:				
Oil & Gas	89,490	132,176	184,089	311,803
All Other	661,706	695,597	1,325,675	2,680,105
Total Distributors	751,196	1,393,154	1,509,764	2,991,908
Construction:				
Oil & Gas	103,834	177,410	251,216	392,688
All Other	469,108	701,786	905,580	1,492,449
Total Construction	572,942	879,196	1,156,796	1,885,137
Contractors' Products	242,286	369,912	478,933	792,323
Automotive:				
Vehicles, Parts	667,795	1,686,737	1,577,012	3,501,800
Forgings	22,975	52,814	49,843	114,643
Total Automotive	690,770	1,739,551	1,626,855	3,616,443
Railroad:				
Rails, Track, etc.	33,424	87,124	74,266	196,647
Cars & Locomotives	71,042	224,862	161,336	455,166
Rapid Transit Systems	4,253	3,228	7,117	6,267
Total Railroad	108,719	315,214	242,719	658,080
Shipbuilding	43,741	61,198	92,197	138,505
Aircraft	5,258	8,395	11,499	17,465
Oil & Gas Drilling	28,512	60,523	60,448	123,788
Mining, Lumbering, etc.	20,591	27,088	39,443	61,526
Agricultural:				
Machinery	57,490	99,130	115,384	209,621
All Other	21,122	23,869	37,401	55,260
Total Agricultural	78,612	122,999	152,785	264,881
Machinery, Tools	261,775	449,962	510,998	950,606
Elec. Machinery, etc.	138,257	223,821	276,386	466,264
Appliances, etc.	124,914	203,364	252,753	410,534
Other Equipment	125,027	180,756	256,930	383,654
Containers:				
Cans & Closures	409,266	447,161	933,502	952,756
Barrels, Drums, etc.	53,995	90,383	114,388	192,323
All Other	28,887	63,122	61,546	129,733
Total Containers	494,148	600,666	1,109,436	1,274,812
Ordnance, etc.	12,482	11,682	25,767	25,442
Exports	115,419	153,219	202,916	302,344
Nonclassified	142,230	194,694	291,543	394,773
Total Shipments	4,250,720	7,583,033	8,881,888	16,002,536

Data from American Iron & Steel Institute.

Mixing KNOW-HOW with SHOW-HOW

Stainless Specialists from Chicago Steel Service

Collaborate with Davis Engineers

to Add Extra Quality to

Davis Efficiency Kitchens Without Extra Cost

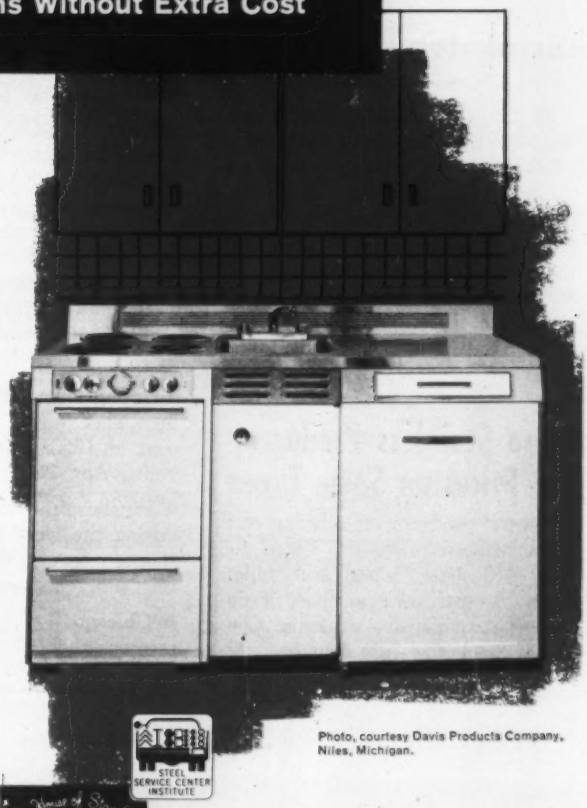
PROBLEM: In producing their line of efficiency kitchens, Davis Products engineers were faced with numerous problems involving the porcelain enamel tops used. Cracking and chipping. Warping. High cost of maintaining color inventories. And because they did not do the porcelain enameling themselves, they did not have the quality control desired.

SOLUTION: Exploring the possibilities of stainless steel for their unit tops, Davis consulted "House of Stainless" specialists. A type of polished sheet was recommended at the start and methods of fabrication were developed so that existing facilities at Davis could be used to manufacture the stainless tops. This move eliminated all of the problems originally faced with porcelain enamel, and Davis found that the new stainless tops had enthusiastic market acceptance.

But this was just a start. Alert to new developments, our specialists later called this customer's attention to a new rolled finish that would eliminate the extra cost involved in buying polished material.

Continued study of Davis production methods and product requirements opened up the possibility of using coil material. An inexpensive de-coiling mechanism was developed, in the Davis plant, which enabled them to adapt the coil material to their production. All this help has added up to the successful use of stainless steel unit tops and, at no increase in cost over the porcelain enamel tops originally used.

That's what we mean when we talk about metallurgical service at the House of Stainless. It costs you nothing extra and it is backed by prompt deliveries from our complete warehouse stocks or direct from one of our many mill sources.



Photo, courtesy Davis Products Company, Niles, Michigan.

STEEL SERVICE CENTER INSTITUTE

The House of Stainless

STEEL AT YOUR SERVICE STEEL

Just phone LAfayette 3-7210

CHICAGO STEEL SERVICE COMPANY

Kildare Avenue at 45th Street, Chicago 32, Illinois
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Milwaukee District Office: 757 N. Broadway, Milwaukee 2, Wisc. Telephone BRoadway 3-7874
Sales Representatives at Bloomington and Rockford, Ill.; Indianapolis and South Bend, Ind.; Davenport, Iowa; Grand Rapids, Mich., Minneapolis, Minn.; Appleton and Wausau, Wisc.

YOUR DEPENDABLE SOURCE FOR CARBON AND STAINLESS STEEL; ALSO INCO ALLOY BAR, WIRE AND STRIP

(*Concluded from Page* 178)

• **Elect Officers** — P. G. Banker, president, Mid-State Steel Co., Nashville, Tenn., was elected president of the chapter. Other officers named: Secretary-treasurer, George C. Gabler, president, Moore Steel Inc., New Orleans; regional vice presidents, Jack Blackwell, O'Neal Steel Inc., Birmingham; Wilson Young, Joseph T. Ryerson & Son Inc., Charlotte, N. C.; and Howard Read, Orleans Materials & Equipment Co. Inc., New Orleans.

Distributors . . .

Prices, Page 189

Bookings by the steel service centers are showing small, consistent gains. In some instances, sales are the best so far this year. Some distributors look for their April business to be a shade better than that in March and are anticipating still further gains in May. Their inventories are still high in relation to sales, but they are gradually tapering.

More Stainless Producers Cut Prices on Some Types

Several producers of stainless steel have reduced prices on Types 403 and 410 bars, wire, and billets about 10 per cent to meet a developing competitive situation. Crucible Steel Co. of America, Allegheny Ludlum Steel Corp., and Jones & Laughlin Steel Corp. announced reductions in line with action taken earlier by Carpenter Steel Co. It's expected other producers will take similar action.

Under the new price schedule 410 bars will sell for 31.50 cents a pound, billets for 26.75 cents, and wire for 29.75 cents. Previously, bars were quoted at 35.00 cents, billets at 29.25 cents, and wire at 33.25 cents.

Rise in Steel Production Maintains 3 per cent Rate

STEEL INGOT production increased to about 1.8 million tons in the week ended Apr. 22, STEEL estimates. It was the third straight week that a 3 per cent or greater gain was recorded and brought output to the highest level since the week ended May 28, 1960. Operations are expected to rise still more.

• **Youngstown**—The operating rate here shot up 6 points to 40 per cent of 1960 capacity in the week ended Apr. 22.

• **Pittsburgh** — Steelmaking here during the week ended Apr. 22 hit 60 per cent of 1960 capacity for the first time this year.

• **Chicago** — Operations here increased about 1 point during the week ended Apr. 22 on the basis of 1960 capacity.

• **Detroit** — Steel production rose about 2 points here (based on 1960 capacity) in the week ended Apr. 22 to a new high since August, 1960. Orders from automakers are picking up, indicating a continued steelmaking uptrend.

• **Birmingham**—The ingot rate for this district is estimated by STEEL at 67.5 per cent of 1960 capacity for the week ended Apr. 22, a gain of about 2 points over the preceding week.

• **Buffalo** — Steel production advanced in the week ended Apr. 22. Republic Steel Corp. relit an idle open hearth furnace—two of nine are now in production at the mill. Bethlehem Steel has put three idle open hearths into operation.

• **Philadelphia** — Steel production continues to rise in the Eastern district. The gain in the week ended Apr. 22 follows a 3 point rise in the steel index the preceding week—when it reached 103, based on average output for 1957-59.

• **St. Louis**— The general outlook here is for a moderate rise in production over coming weeks.

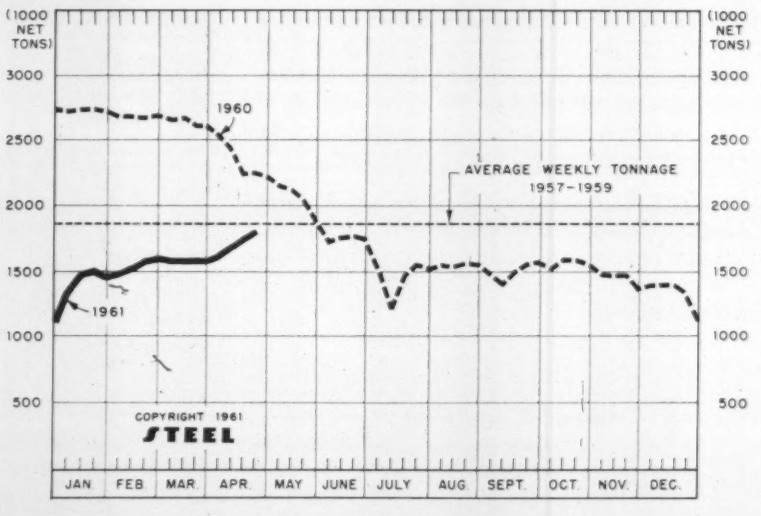
• **Cleveland**—Production in this district has made five straight weekly increases and is at the highest level since November of last year. The uptrend is expected to continue into May.

STEEL INGOT PRODUCTION

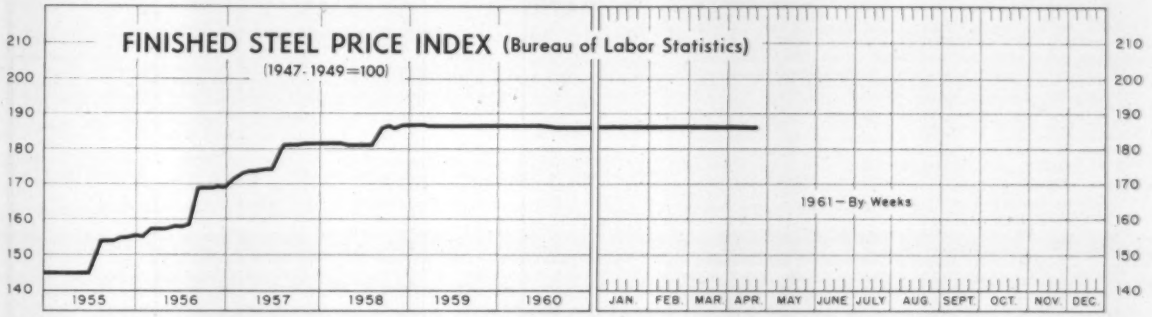
Weeks Ended	Net Tons	Change
Apr. 22	1,800,000*	+ 3.0%
Apr. 15	1,748,000	+ 3.1%
Apr. 8	1,696,000	+ 3.9%
Totals to Apr. 15		
1961	23,402,000	−40.4%
1960	39,292,000	

DISTRICTS	Week Ended —Apr. 15— Tons‡	Index†	Week Ended Apr. 8 Index†
Northeastern	275,212	103	100
Buffalo	85,672	88	80
Pittsburgh	347,052	86	82
Youngstown	118,987	70	65
Cleveland	84,262	91	90
Detroit	111,212	106	104
Chicago	359,113	96	96
Cincinnati	65,602	87	89
St. Louis	58,856	112	110
Southern	110,564	102	100
Western	132,112	113	107
Industry	1,748,000	93.8	91.0

*Estimated by STEEL. †1957-59=100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Apr. 18, 1961	Week Ago	Month Ago	Mar. Index	Year Ago
186.1	186.1	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Apr. 18

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.335
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.296
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed (80-rod spool)	8.372
Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Apr. 19 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	209.10
Index in cents per lb	6.713	6.713	6.713	6.713	5.665

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.02
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	60.06
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	59.61
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	61.06
Steelmaking Scrap, GT	38.67	39.50	38.67	33.67	55.00

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Apr. 19 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H. R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, 7/32-9/64" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	Apr. 19 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$61.00
Basic, Valley	66.00	66.00	66.00	66.00	60.00
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	63.76
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	60.50
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	64.26
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	60.50
Malleable, Chicago	66.50	66.50	66.50	66.50	60.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$36.50	$36.50	$34.50	$34.50	$54.50
No. 1 Heavy Melt, E. Pa.	41.00	43.00	43.00	35.00	56.00
No. 1 Heavy Melt, Chicago	38.50	39.00	38.50	31.50	54.50
No. 1 Heavy Melt, Valley	36.50	38.50	36.50	36.50	60.50
No. 1 Heavy Melt, Cleve.	33.50	36.50	33.50	33.50	57.50
No. 1 Heavy Melt, Buffalo	31.50	31.50	29.50	30.50	55.50
Rails, Rerolling, Chicago	59.50	59.50	60.50	53.50	72.50
No. 1 Cast, Chicago	43.50	43.50	44.50	45.50	51.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Code number following mill point indicates producing company. Key to producers, page 183; footnotes, page 187. Mill prices as reported to STEEL, Apr. 19, cents per pound except as otherwise noted. *Changes shown in italics.*

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall, Pa. U5 ..... $76.00

INGOT, Alloy (NT)
Detroit S41 ..... $82.00
Economy, Pa. B14 ..... 82.00
Farrell, Pa. S3 ..... 82.00
Lowellville, O. S3 ..... 82.00
Midland, Pa. C18 ..... 82.00
Munhall, Pa. U5 ..... 82.00
Sharon, Pa. S3 ..... 82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)
Bartonville, Ill. K4 ..... $82.00
Bessemer, Pa. U5 ..... 80.00
Buffalo R2 ..... 80.00
Clairton, Pa. U5 ..... 80.00
Ensley, Ala. T2 ..... 80.00
Fairfield, Ala. T2 ..... 80.00
Fontana, Calif. K1 ..... 90.50
Gary, Ind. U5 ..... 80.00
Johnstown, Pa. B2 ..... 80.00
Lackawanna, N.Y. B2 ..... 80.00
Munhall, Pa. U5 ..... 80.00
Owensboro, Ky. G8 ..... 80.00
S. Chicago, Ill. R2, U5 ..... 80.00
S. Duquesne, Pa. U5 ..... 80.00
Sterling, Ill. N15 ..... 80.00
Youngstown R2 ..... 80.00

Carbon, Forging (NT)
Bessemer, Pa. U5 ..... $99.50
Buffalo R2 ..... 99.50
Canton, O. R2 ..... 102.00
Clairton, Pa. U5 ..... 99.50
Conshohocken, Pa. A3 ..... 104.50
Ensley, Ala. T2 ..... 99.50
Fairfield, Ala. T2 ..... 99.50
Farrell, Pa. S3 ..... 99.50
Fontana, Calif. K1 ..... 109.00
Gary, Ind. U5 ..... 99.50
Geneva, Utah C11 ..... 99.50
Houston S5 ..... 104.50
Johnstown, Pa. B2 ..... 99.50
Lackawanna, N.Y. B2 ..... 99.50
Los Angeles B3 ..... 109.00
Midland, Pa. C18 ..... 99.50
Munhall, Pa. U5 ..... 99.50
Owensboro, Ky. C8 ..... 99.50
Seattle B3 ..... 109.00
Sharon, Pa. S3 ..... 99.50
S. Chicago R2, U5, W14 ..... 99.50
S. Duquesne, Pa. U5 ..... 99.50
S. San Francisco B3 ..... 109.00
Warren, O. C17 ..... 99.50

Alloy, Forging (NT)
Bethlehem, Pa. B2 ..... $119.00
Bridgeport, Conn. C32 ..... 119.00
Buffalo R2 ..... 119.00
Canton, O. R2, T7 ..... 119.00
Conshohocken, Pa. A3 ..... 126.00
Detroit S41 ..... 119.00
Economy, Pa. B14 ..... 119.00
Farrell, Pa. S3 ..... 119.00
Fontana, Calif. K1 ..... 140.00
Gary, Ind. U5 ..... 119.00
Houston S5 ..... 124.00
Ind. Harbor, Ind. Y1 ..... 119.00
Johnstown, Pa. B2 ..... 119.00
Lackawanna, N.Y. B2 ..... 119.00
Los Angeles B3 ..... 139.00
Lowellville, O. S3 ..... 119.00
Massillon, O. R2 ..... 119.00
Midland, Pa. C18 ..... 119.00
Munhall, Pa. U5 ..... 119.00
Owensboro, Ky. G8 ..... 119.00
Seattle(6) B3 ..... 140.00
Sharon, Pa. S3 ..... 119.00
S. Chicago R2, U5, W14 ..... 119.00
S. Duquesne, Pa. U5 ..... 119.00
Struthers, O. Y1 ..... 119.00
Warren, O. C17 ..... 119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ..... $122.50
Canton, O. R2 ..... 125.00
Cleveland R2 ..... 122.50
Gary, Ind. U5 ..... 122.50
S. Chicago, Ill. R2, W14 ..... 122.50
S. Duquesne, Pa. U5 ..... 122.50
Warren, O. C17 ..... 122.50

SKELP
Aliquippa, Pa. J5 ..... 5.05
Benwood, W. Va. W10 ..... 5.05
Ind. Harbor Ind. Y1 ..... 5.05
Munhall, Pa. U5 ..... 5.05
Pittsburgh J5 ..... 5.05
Warren, O. R2 ..... 5.05
Youngstown R2, U5 ..... 5.05

WIRE RODS
Alabama City, Ala. R2 ..... 6.40
Aliquippa, Pa. J5 ..... 6.40
Alton, Ill. L1 ..... 6.60
Bartonville, Ill. K4 ..... 6.50
Buffalo W12 ..... 6.40
Cleveland A7 ..... 6.40
Donora, Pa. A7 ..... 6.40
Fairfield, Ala. T2 ..... 6.40
Houston S5 ..... 6.65
Indiana Harbor, Ind. Y1 ..... 6.40
Johnstown, Pa. B2 ..... 6.40
Joliet, Ill. A7 ..... 6.40
Kansas City, Mo. S5 ..... 6.65
Kokomo, Ind. C16 ..... 6.50
Los Angeles B3 ..... 7.20
Minnequa, Colo. C10 ..... 6.65
Monessen, Pa. P7 ..... 6.40
Pittsburg, Calif. C11 ..... 7.20
Portsmouth, O. P12 ..... 6.40
Roebling, N.J. R5 ..... 6.50
S. Chicago, Ill. R2, W14 ..... 6.40
Sparrows Point, Md. B2 ..... 6.50
Sterling, Ill. (1) N15 ..... 6.40
Sterling, Ill. N15 ..... 6.50
Struthers, O. Y1 ..... 6.40
Worcester, Mass. A7 ..... 6.70

STRUCTURALS

Carbon Steel Std. Shapes
Alabama City, Ala. R2 ..... 5.50
Aliquippa, Pa. J5 ..... 5.50
Atlanta A11 ..... 5.70
Bessemer, Ala. T2 ..... 5.50
Bethlehem, Pa. B2 ..... 5.55
Birmingham C15 ..... 5.50
Clairton, Pa. U5 ..... 5.50
Fairfield, Ala. T2 ..... 5.50
Fontana, Calif. K1 ..... 6.30
Gary, Ind. U5 ..... 5.50
Geneva, Utah C11 ..... 5.50
Houston S5 ..... 5.60
Ind. Harbor, Ind. I-2, Y1 ..... 5.50
Johnstown, Pa. B2 ..... 5.55
Joliet, Ill. P22 ..... 5.50
Kansas City, Mo. S5 ..... 5.60
Lackawanna, N.Y. B2 ..... 5.55
Los Angeles B3 ..... 6.20
Minnequa, Colo. C10 ..... 5.80
Munhall, Pa. U5 ..... 5.50
Niles, Calif. P1 ..... 6.25
Phoenixville, Pa. P4 ..... 5.55
Portland, Oreg. O4 ..... 6.25
Seattle B3 ..... 6.25
S. Chicago, Ill. U5, W14 ..... 5.50
S. San Francisco B3 ..... 6.15
Sterling, Ill. N15 ..... 5.50
Struthers, O. Y1 ..... 5.50
Torrance, Calif. C11 ..... 6.20
Weirton, W. Va. W6 ..... 5.50

Wide Flange
Bethlehem, Pa. B2 ..... 5.55
Clairton, Pa. U5 ..... 5.50
Fontana, Calif. K1 ..... 6.45
Indiana Harbor, Ind. I-2 ..... 5.50
Lackawanna, N.Y. B2 ..... 5.55
Munhall, Pa. U5 ..... 5.50
Phoenixville, Pa. P4 ..... 5.55
S. Chicago, Ill. U5 ..... 5.50
Sterling, Ill. N15 ..... 5.50
Weirton, W. Va. W6 ..... 5.50

Alloy Std. Shapes
Aliquippa, Pa. J5 ..... 6.80
Clairton, Pa. U5 ..... 6.80
Gary, Ind. U5 ..... 6.80
Houston S5 ..... 6.90
Munhall, Pa. U5 ..... 6.80
S. Chicago, Ill. U5, W14 ..... 6.80

H.S., L.A., Std. Shapes
Aliquippa, Pa. J5 ..... 8.05
Bessemer, Ala. T2 ..... 8.05
Bethlehem, Pa. B2 ..... 8.10
Clairton, Pa. U5 ..... 8.05
Fairfield, Ala. T2 ..... 8.05
Fontana, Calif. K1 ..... 8.85
Gary, Ind. U5 ..... 8.05
Geneva, Utah C11 ..... 8.05
Houston S5 ..... 8.15
Ind. Harbor, Ind. I-2 Y1/8.05
Johnstown, Pa. B2 ..... 8.10
Kansas City, Mo. S5 ..... 8.15
Lackawanna, N.Y. B2 ..... 8.10
Los Angeles B3 ..... 8.75
Munhall, Pa. U5 ..... 8.05
Phoenixville, Pa. P4 ..... 8.10
Seattle B3 ..... 8.80
S. Chicago, Ill. U5, W14 ..... 8.05
S. San Francisco B3 ..... 8.70
Sterling, Ill. N15 ..... 7.75
Struthers, O. Y1 ..... 8.05

H.S., L.A., Wide Flange
Bethlehem, Pa. B2 ..... 8.10
Ind. Harbor, Ind. I-2 ..... 8.05
Lackawanna, N.Y. B2 ..... 8.10
Munhall, Pa. U5 ..... 8.05
S. Chicago, Ill. U5 ..... 8.05
Sterling, Ill. N15 ..... 7.75

PILING

BEARING PILES
Bethlehem Pa. B2 ..... 5.55
Ind. Harbor, Ind. I-2 ..... 5.50
Lackawanna, N.Y. B2 ..... 5.55
Munhall, Pa. U5 ..... 5.50
S. Chicago, Ill. I-2, U5 ..... 5.50

STEEL SHEET PILING
Ind. Harbor, Ind. I-2 ..... 6.50
Lackawanna, N.Y. B2 ..... 6.50
Munhall, Pa. U5 ..... 6.50
S. Chicago, Ill. I-2, U5 ..... 6.50
Weirton, W. Va. W6 ..... 6.50

PLATES

PLATES, Carbon Steel
Alabama City, Ala. R2 ..... 5.30
Aliquippa, Pa. J5 ..... 5.30
Ashland, Ky. (15) A10 ..... 5.30
Atlanta A11 ..... 5.50
Bessemer, Ala. T2 ..... 5.30
Clairton, Pa. U5 ..... 5.30
Claymont, Del. P4 ..... 5.30
Cleveland J5, R2 ..... 5.30
Coatesville, Pa. L7 ..... 5.30
Conshohocken, Pa. A3 ..... 5.30
Ecorse, Mich. G5 ..... 5.30
Fairfield, Ala. T2 ..... 5.30
Farrell, Pa. S3 ..... 5.30
Fontana, Calif. (30) K1 ..... 6.10
Gary, Ind. U5 ..... 5.30
Geneva, Utah C11 ..... 5.30
Granite City, Ill. G4 ..... 5.40
Houston S5 ..... 5.40
Ind. Harbor, Ind. I-2, Y1 ..... 5.30
Johnstown, Pa. B2 ..... 5.30
Lackawanna, N.Y. B2 ..... 5.30
Mansfield, O. E6 ..... 5.30
Minnequa, Colo. C10 ..... 6.15
Munhall, Pa. U5 ..... 5.30
Newport, Ky. A2 ..... 5.30
Pittsburgh J5 ..... 5.30
Riverdale, Ill. A1 ..... 5.30
Seattle B3 ..... 6.00
Sharon, Pa. S3 ..... 5.30
S. Chicago, Ill. U5, W14 ..... 5.30
Sparrows Point, Md. B2 ..... 5.30
Sterling, Ill. N15 ..... 5.30
Steubenville, O. W10 ..... 5.30
Warren, O. R2 ..... 5.30
Youngstown U5, Y1 ..... 5.30
Youngstown(27) R2 ..... 5.30

PLATES, Carbon Abras. Resist.
Claymont, Del. P4 ..... 7.05
Fontana, Calif. K1 ..... 7.85
Geneva, Utah C11 ..... 7.05
Houston S5 ..... 7.15
Johnstown, Pa. B2 ..... 7.05
Sparrows Point, Md. B2 ..... 7.05

PLATES, Wrought Iron
Economy, Pa. B14 ..... 14.10

PLATES, H.S., L.A.
Aliquippa, Pa. J5 ..... 7.95
Ashland, Ky. A10 ..... 7.95
Bessemer, Ala. T2 ..... 7.95
Clairton, Pa. U5 ..... 7.95
Claymont, Del. P4 ..... 7.95
Cleveland J5, R2 ..... 7.95
Coatesville, Pa. L7 ..... 7.95
Conshocken, Pa. A3 ..... 7.95
Economy, Pa. B14 ..... 7.95
Ecorse, Mich. G5 ..... 7.95
Fairfield, Ala. T2 ..... 7.95
Farrell, Pa. S3 ..... 7.95
Fontana, Calif. (30) K1 ..... 8.75
Gary, Ind. U5 ..... 7.95
Geneva, Utah C11 ..... 7.95
Houston S5 ..... 8.05
Ind. Harbor, Ind. I-2, Y1 ..... 7.95
Johnstown, Pa. B2 ..... 7.95
Munhall, Pa. U5 ..... 7.95
Pittsburgh J5 ..... 7.95
Seattle B3 ..... 8.85
Sharon, Pa. S3 ..... 7.95
S. Chicago, Ill. U5, W14 ..... 7.95
Sparrows Point, Md. B2 ..... 7.95
Sterling, Ill. N15 ..... 7.625
Warren, O. R2 ..... 7.95
Youngstown U5, Y1 ..... 7.95

PLATES, Alloy
Aliquippa, Pa. J5 ..... 7.50
Claymont, Del. P4 ..... 7.50
Coatesville, Pa. L7 ..... 7.50
Economy, Pa. B14 ..... 7.50
Farrell, Pa. S3 ..... 7.50
Fontana, Calif. K1 ..... 8.30
Gary, Ind. U5 ..... 7.50
Houston S5 ..... 7.60
Ind. Harbor, Ind. Y1 ..... 7.50
Johnstown, Pa. B2 ..... 7.50
Lowellville, O. S3 ..... 7.50
Munhall, Pa. U5 ..... 7.50
Newport, Ky. A2 ..... 7.50
Pittsburgh J5 ..... 7.50
Seattle B3 ..... 8.40
Sharon, Pa. S3 ..... 7.50
S. Chicago, Ill. U5, W14 .. 7.50
Sparrows Point, Md. B2 .. 7.50
Youngstown Y1 ..... 7.50

FLOOR PLATES
Cleveland J5 ..... 6.375
Claymont, Del. P4 ..... 6.375
Conshohocken, Pa. A3 .. 6.375
Ind. Harbor, Ind. I-2 .. 6.375
Munhall, Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
S. Chicago, Ill. U5 ..... 6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10 ... 5.55
Ashland l.c.l. (15) A10 .. 6.05
Cleveland c.l. R2 ..... 6.05
Warren, O. R2 ..... 6.05

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)
Ala. City, Ala. (9) R2 ... 5.675
Aliquippa, Pa. (9) J5 ... 5.675
Alton, Ill. L1 ..... 5.875
Atlanta (9) A11 ..... 5.875
Bessemer, Ala. (9) T2 ... 5.675
Birmington (9) C15 ... 5.675
Buffalo (9) R2 ..... 5.675
Canton, O. (23) R2 ..... 6.15
Clairton, Pa. (9) U5 ... 5.675
Cleveland (9) R2 ..... 5.675
Ecorse, Mich. (9) G5 ... 5.675
Emeryville, Calif. J7 ... 6.425
Fairfield, Ala. (9) T2 ... 5.675
Fairless, Pa. (9) U5 ... 5.825
Fontana, Calif. (9) K1 .. 6.375
Gary, Ind. (9) U5 ..... 5.675
Houston (9) S5 ..... 5.925
Ind. Harbor (9) I-2, Y1 .. 5.675
Johnstown, Pa. (9) B2 ... 5.675
Joliet, Ill. P2 ..... 5.675
Kansas City, Mo. (9) S5 .. 5.925
Lackawanna (9) B2 ..... 5.675
Los Angeles (9) B3 ..... 6.375
Massillon, O. (23) R2 ... 6.15
Midland, Pa. (23) C18 ... 6.025
Milton, Pa. M18 ..... 5.825
Minnequa, Colo. C10 ... 6.125
Niles, Calif. P1 ..... 6.375
Owensboro, Ky. (9) G8 ... 6.025
Pittsburg, Calif. (9) C11 .. 6.375
Pittsburgh (9) J5 ..... 5.675
Portland, Oreg. O4 ..... 6.425
Riverdale, Ill. (9) A1 ... 5.675
Seattle (9) A24, B3, N15 .. 6.425
S. Ch'e'go (9) R2, U5, W14 5.675
S. Duquesne, Pa. (9) U5 .. 5.675
S. San Fran., Calif. (9) B3 6.425
Sterling, Ill. (1) (9) N15 .. 5.675
Sterling, Ill. (9) N15 .... 5.775
Struthers, O. (9) Y1 .... 5.675
Tonawanda, N.Y. B12 .... 5.675
Torrance, Calif. (9) C11 .. 6.375
Warren, O. C17 ..... 6.025
Youngstown (9) R2, U5 .. 5.675

BARS, Hot-Rolled Alloy
Aliquippa, Pa. J5 ..... 6.725
Bethlehem, Pa. B2 ..... 6.725
Bridgeport, Conn. C32 ... 6.80
Buffalo R2 ..... 6.725
Canton, O. R2, T7 ..... 6.725
Clairton, Pa. U5 ..... 6.725
Detroit S41 ..... 6.725
Economy, Pa. B14 ..... 6.725
Ecorse, Mich. G5 ..... 6.725
Farrell, Pa. S3 ..... 6.725
Fontana, Calif. K1 ..... 7.775
Gary, Ind. U5 ..... 6.725
Houston S5 ..... 6.975
Ind. Harbor, Ind. I-2, Y1 .. 6.725
Johnstown, Pa. B2 ..... 6.725
Kansas City, Mo. S5 .... 6.975
Lackawanna, N.Y. B2 .... 6.725
Los Angeles B3 ..... 7.775
Lowellville, O. S3 ..... 6.725
Massillon, O. R2 ..... 6.725
Midland, Pa. C18 ..... 6.725
Owensboro, Ky. G8 ..... 6.725
Pittsburgh J5 ..... 6.725
Seattle(6) B3 ..... 7.825
Sharon, Pa. S3 ..... 6.725
S. Chicago R2, U5, W14 .. 6.725
S. Duquesne, Pa. U5 .... 6.725
Struthers, O. Y1 ..... 6.725
Warren, O. C17 ..... 6.725
Youngstown U5 ..... 6.725

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy
Aliquippa, Pa. J5 ..... 8.30
Bessemer, Ala. T2 ..... 8.30
Bethlehem, Pa. B2 ..... 8.30
Clairton, Pa. U5 ..... 8.30
Cleveland R2 ..... 8.30
Ecorse, Mich. G5 ..... 8.30
Fairfield, Ala. T2 ..... 8.30
Fontana, Calif. K1 ..... 9.00
Gary, Ind. U5 ..... 8.30
Houston S5 ..... 8.55
Ind. Harbor, Ind. Y1 .... 8.30
Johnstown, Pa. B2 ..... 8.30
Kansas City, Mo. S5 .... 8.55
Lackawanna, N.Y. B2 .... 8.30
Los Angeles B3 ..... 9.00
Pittsburgh J5 ..... 8.30
Seattle B3 ..... 9.05
S. Chicago, Ill. R2, W14 .. 8.30
S. Duquesne, Pa. U5 .... 8.30
S. San Francisco B3 .... 9.05
Sterling, Ill. N15 ..... 7.925
Struthers, O. Y1 ..... 8.30
Youngstown U5 ..... 8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem, Pa. (9) B2 .. 5.825
Houston (9) S5 ..... 5.925
Kansas City, Mo. (9) S5 .. 5.925
Lackawanna (9) B2 ..... 5.675
Sterling, Ill. N15 ..... 5.775
Sterling, Ill. (1) N15 .... 5.675
Tonawanda, N.Y. B12 .... 5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa, Pa. J5 ..... 5.675
Atlanta A11 ..... 5.875
Joliet, Ill. P22 ..... 5.675
Minnequa, Colo. C10 ..... 6.125
Niles, Calif. P1 ..... 6.375
Pittsburgh J5 ..... 5.675
Portland, Oreg. O4 ..... 6.425
San Francisco S7 ..... 6.52
Seattle B3 ..... 6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy, Pa. B14 ..... 16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa, Pa. J5 ..... 6.80
Clairton, Pa. U5 ..... 6.80
Gary, Ind. U5 ..... 6.80
Houston S5 ..... 7.05
Kansas City, Mo. S5 .... 7.05
Pittsburgh J5 ..... 6.80
Youngstown U5 ..... 6.80

BARS, C.F. Loaded
(Including loaded extra)
Carbon
Los Angeles P2, S30 ... 11.75*

Alloy
Ambridge, Pa. W18 ... 10.175
Beaver Falls, Pa. M12 .. 10.175
Camden, N.J. P13 .... 10.35
Chicago W18 ..... 10.175
Elyria, O. W8 ..... 10.175
Monaca, Pa. S17 ..... 10.175
Newark, N.J. W18 .... 10.35
Spring City, Pa. K3 .... 10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge, Pa. W18 ..... 7.65
Beaver Falls, Pa. M12, R2 . 7.65
Birmingham C15 ..... 8.25
Buffalo B5 ..... 7.70
Camden, N.J. P13 ..... 8.10
Carnegie, Pa. C12 ..... 7.65
Chicago W18 ..... 7.65
Cleveland A7, C20 ..... 7.65
Detroit B5, H5, P17 ..... 7.85
Detroit S41 ..... 7.65
Donora, Pa. A7 ..... 7.65
Elyria, O. W8 ..... 7.65
Franklin Park, Ill. N5 ... 7.65
Gary, Ind. R2 ..... 7.65
Green Bay, Wis. F7 ..... 7.65
Hammond, Ind. J5, L2 .... 7.65
Hartford, Conn. R2 .... 8.15
Harvey, Ill. B5 ..... 7.65
Los Angeles(49) S30 .... 9.10
Los Angeles(49) P2, R2 .. 9.10
Mansfield, Mass. B5 .... 8.20
Massillon, O. R2, R8 .... 7.65
Midland, Pa. C18 ..... 7.65
Monaca, Pa. S17 ..... 7.65
Newark, N.J. W18 ..... 8.10
New Castle, Pa. (17) B4 .. 7.65
Pittsburgh J5 ..... 7.65
Plymouth, Mich. P5 .... 7.90
Putnam, Conn. W18 .... 8.20
Readville, Mass. C14 .... 8.20
Seattle(49) S30 ..... 9.10
S. Chicago, Ill. W14 .... 7.65
Spring City, Pa. K3 .... 8.10
Struthers, O. Y1 ..... 7.65
Warren, O. C17 ..... 7.65
Waukegan, Ill. A7 ..... 7.65
Willimantic, Conn. J5 .... 8.15
Youngstown F3, Y1 .... 7.65

BARS, Cold-Finished Alloy
(Turned and Ground
Cumberland, Md. (5) C19 . 6.55

BARS, Cold-Finished Alloy
Ambridge, Pa. W18 .... 9.025
Beaver Falls, Pa. M12, R2 9.025
Bethlehem, Pa. B2 .... 9.025
Bridgeport, Conn. C32 .. 9.175
Buffalo B5 ..... 9.025
Camden, N.J. P13 ..... 9.20
Canton, O. T7 ..... 9.025
Carnegie, Pa. C12 .... 9.025
Chicago W18 ..... 9.025
Cleveland A7, C20 ..... 9.25
Detroit B5, P17 ..... 9.225
Detroit H5, S41 ..... 9.025
Donora, Pa. A7 ..... 9.025
Elyria, O. W8 ..... 9.025
Franklin Park, Ill. N5 .... 9.025
Gary, Ind. R2 ..... 9.025
Green Bay, Wis. F7 .... 9.025
Hammond, Ind. J5, L2 .. 9.025
Hartford, Conn. R2 .... 9.325
Harvey, Ill. R5 ..... 9.025
Lackawanna, N.Y. B3 .... 9.025
Los Angeles P2, S30 .... 11.00
Mansfield, Mass. B5 .... 9.325
Massillon, O. R2; R8 .... 9.025
Midland, Pa. C18 ..... 9.025
Monaca, Pa. S17 ..... 9.025
Newark, N.J. W18 ..... 9.20
Plymouth, Mich. P5 .... 9.225
S. Chicago, Ill. W14 .... 9.025
Spring City, Pa. K3 .... 9.20

Struthers,O. Y1 ....9.025
Warren,O. C17 ....9.025
Waukegan, Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.00
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala. T2 ....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa. (S.R.)B14 15.10
Economy,Pa. (D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
Mck.Rks.(Staybolt)L5 .20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4) (44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4)F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ...5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Nile s,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 ....6.275

SHEETS, H. R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 ....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(38) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warreg,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

Sheets, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 .....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu	Cu Steel	Fe
Ala.City,Ala. R2	7.125	....	....
Ashland,Ky. A10	7.225	7.475	....
Canton,O. R2	....7.125	....	....
Fairfield,Ala. T2	7.125	7.375	....
Gary,Ind. U5	....7.125	7.375	....
GraniteCity,Ill. G4	7.325	....	....
Ind.Harbor,Ind. I-2	7.225	7.425	....
Irvin,Pa. U5	....7.125	7.375	....
Kokomo,Ind. C16	7.325	....	....
MartinsFry. W10	7.125	7.375	....
Pitts.,Calif. C11	7.975	....	....
Pittsburgh J5	....7.125	....	....
SparrowsPt. B2	..7.225	....	....
Weirton W6	....7.125	....	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, ENAMELING

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 .....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carton

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 ....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfied,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackawanna,N.Y.(25) B2 5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowelville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 ....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3 8.325
SparrowsPoint,Md. B2 ..7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.425
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10..7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ...7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Riverdale,Ill. A1 .....7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ...8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ....7.975
Youngstown Y1 .....7.425
Youngstown S41 .....7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ....15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R. Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ..7.50*
New Castle,Pa. M23 ..7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5 .7.425*
Worcester,Mass. A7 ....7.975
Youngstown S41 .....7.425*

Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.10	9.35	9.75
Fairless,Pa. U5	9.10	9.35	9.75
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.36	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)	
Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
Granite City,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

* Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16 ...8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 ..12.65
KansasCity,Mo. S3U3 ...12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.96
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ....13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 ....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ...9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 .....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

HOW KEYSTONE WIRE *adds Sales Appeal* to bobby pins...

To manufacture millions of identical bobby pins, Sta-Rite Ginnie Lou, Inc., Shelbyville, Illinois, needed a high quality spring wire that would perform consistently with long runs in their high-speed automatic wire forming machines.

For extra "sales appeal", Sta-Rite Ginnie Lou specified a wire with superior surface that would take an attractive finish to please discriminating women. It had to have high test flex and maximum spring back qualities. This called for uniform temper and close diameter tolerance throughout the coil.

Keystone Metallurgists, in close cooperation with Sta-Rite Ginnie Lou, developed a white liquor finish, high carbon *completely clean* spring wire with all these qualities. The large coils are specially packed with rust preventive in payoff packs for long trouble-free runs.

Says Vaughn C. Wallace, Vice President in charge of manufacturing, "Keystone Wire, with its superior finish, produces a bobby pin which meets our high standards of quality and ready acceptance in thousands of outlets across the nation." Keystone's excellent wire forming features are the result of accurately controlled thermal treatment and correct chemical analysis to provide the right structure for this difficult cold rolling and forming operation.

Keystone Wire Specialists can produce a wire for your most exacting specifications. Contact your nearest Keystone Wire Representative soon. Or write us concerning your wire problems.

Keystone Steel & Wire Company, Peoria, Illinois

KEYSTONE

WIRE FOR INDUSTRY

MANUFACTURED AT PEORIA, ILLINOIS, U. S. A.

ALLIS-CHALMERS LIFT TRUCKS keep *Moving* and *Paying* at Vendo

REG. U.S. PAT. OFF.

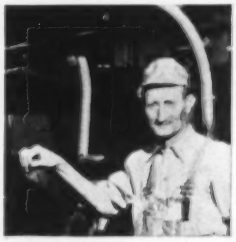
Vendo is one of the world's largest producers of vending machines. Obviously, many of its products are pressed into service without ever leaving the plant. The Allis-Chalmers lift truck is one of 14 in use at this plant.

Four years ago, The Vendo Company put an Allis-Chalmers lift truck to work in its Kansas City, Missouri, plant — and discovered there *is* a dollar-saving difference in lift trucks. As Clyde Hickman, material handling foreman, said then, "A lift truck has to keep moving or you lose money, and ours keep moving."

Clyde Hickman, material handling foreman, says, "these A-C trucks keep moving."

When reminded of this statement recently, Hickman answered, "What I said then still goes — only more so. We now own 12 Allis-Chalmers trucks and operate two others on a rental basis. That original truck has close to 13,000 hours and hasn't needed an engine overhaul — neither has any of the others."

The man responsible for keeping this fleet on the move is Clyde Dent, mechanic. He takes this responsibility seriously. When a truck is pulled in off the job, it gets real "pit stop" service. Here Allis-Chalmers' easy accessibility really pays off. As Clyde described it, "When a lift truck comes in for minor service, we usually get it back on the job before the exhaust pipe cools off, and I've got burns on my arm to prove it!"



Clyde Dent, mechanic, says, "maintenance expenses are low."

Operator John Cromer reports, "I like the way an Allis-Chalmers lift truck performs. I like the transmission. I like the way it handles. I just like the whole machine!"

Let your Allis-Chalmers dealer show you how these tough trucks will keep going, and paying, on *your* job. Ask for a demonstration. Allis-Chalmers, Milwaukee 1, Wisconsin.

BH-149

ALLIS-CHALMERS power for a growing world

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebing,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S. Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIRE WIRE, Automatic Baler (14½ Ga.) per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville, Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield, Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
Kansas City,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill.R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality (6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nuts 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
*Bulk	46

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	39.25
Bulk	46

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(22) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.90
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	HI-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.20	9.61	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	10.41	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.74	10.58	11.77	12.16	9.77	13.35	16.69	10.16	9.62	11.08
Buffalo	8.55	9.30	11.25	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	10.52	11.22	10.55	11.51	10.32	12.68	....	10.53	10.47	12.11
Chicago	9.22	10.20	10.70	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.34	10.26	10.75	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	10.57	10.05	11.75	12.13	9.98	12.98	16.95	10.21	9.81	11.18
Detroit	9.48	10.46	11.05	11.76	9.53	11.01	16.23	10.14	9.43	11.41
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	10.17	9.65	11.35	11.73	9.58	13.10	16.55	9.81	9.41	10.78
Indianapolis	9.66	10.64	11.14	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.84	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.62	10.60	11.10	11.79	9.62	11.05	16.40	9.97	9.46	11.75
Newark, N. J.	9.36	10.13	11.35	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	11.46	9.74	13.25	16.40	10.20	9.51	11.00
Philadelphia	9.50	10.00	10.89	11.25	9.65	11.95	16.48	9.85	8.85	11.10
Pittsburgh	9.22	10.53	11.58	11.49	9.22	11.25	16.95	8.91	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	11.08	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	9.57	10.24	11.39	11.74	9 57	11.49	16.54	9.92	9.41	11.79
San Francisco	10.17	11.69	11.40	11.78	10.07	15.10	18.20	10.49	10.38	12.47
Seattle	11.35	12.45	13.40	12.80	10 80	10.20	17.80	11.59	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.01

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo.; Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183, Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ½ in. and up	12.85
Fines, under ½ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$16.00-16.50*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.70-3.20
60-65%	3.25-3.45

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Diam	Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:

Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60% $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ¼ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe. 36.75, ton del. east of Mississippi.	
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, $8.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	36.50
Bronze powder, 90/10.	54.20
Copper, all types	15.00*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	57.90
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.80	$6.05	$5.75	$5.65	$5.95
Bar Size Angles	5.85	6.10	5.80	5.70	6.00
Structural Angles	5.75	6.00	5.70	5.60	5.90
I-Beams	5.70	5.95	5.65	5.55	5.85
Channels	5.70	5.95	5.65	5.55	5.85
Plates (basic bessemer)	5.45	5.80	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.20	24.70	24.40	24.40	25.20
Barbed Wire (†)	6.35	6.25	6.25	6.10	6.45
Merchant Bars	5.85	6.10	5.80	5.70	6.00
Hot-Rolled Bands	5.95	6.20	5.90	5.80	6.10
Wire Rods, Thomas Commercial No. 5	5.80	5.85	5.75	5.75	6.00
Wire Rods, O.H., No. 5	6.00	6.05	5.95	5.95	6.25
Bright Common Wire Nails (‡)	6.80	7.05	6.75	6.65	6.95

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank car or tank trucks, plant.

Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

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Scrap Price Retreat Is Starting

Easier market develops at several points and pushes down STEEL's composite on No. 1 heavy melting steel 83 cents a ton to $38.67. Export demand exerting less pressure

Scrap Prices, Page 194

● **Philadelphia**—The freer flow of scrap, combined with a scarcity of ships for the movement of tonnage abroad, resulted in a $2 drop in prices on the leading grades of steelmaking scrap last week.

● **New York** — Brokers' buying prices are unchanged. While export demand has slackened, partly because of a shortage of ships, brokers are buying on a conservative basis.

● **Chicago**—Prices on several leading grades of steelmaking scrap have dropped $1 a ton. The market is weaker despite the rising steel rate. The mills appear to be depending on hot metal to a greater extent; several blast furnaces were activated recently.

● **Pittsburgh**—Despite rising steelmaking operations (the district rate hit 60 per cent of capacity for the first time this year in the week ended Apr. 22), scrap prices are weakening. The steel mills appear to be using more hot metal in meeting their increased metallic needs. Prices paid for Pennsylvania Railroad scrap dropped $1 to $3 a ton from a month ago in the latest sale.

● **Detroit**—The market is quiet but steady. Export orders have been filled, and there's no new activity in that area of the market.

● **Buffalo**—Strength has developed in the secondary mill grades. A leading consumer paid $25 for No. 2 bundles, an increase of $3 a ton. At the same time, No. 2 heavy melting rose to $26-$27. Rerolling rails are also $1 higher at $61-$62.

● **Cleveland**—Prices on the leading grades of steelmaking scrap are off about $2 ton, reflecting a couple substantial sales to Valley mills. No. 1 heavy melting is quoted $33-$34 here and $36-$37 in Youngstown. The railroad grades are easy, but prices on the cast grades are holding. Interest in tonnage for export is fading rapidly. Large tonnages destined for export are piled on docks at Lorain and Ashtabula, Ohio.

● **Cincinnati** — Signs of weakness have developed in this market. Some traders are predicting a price decline on the principal steelmaking grades when the mills re-enter the market for their May requirements.

● **St. Louis**—Prices are soft, with one large consuming mill out of the market. Not much change is expected the rest of this month.

● **Birmingham**—No new domestic buying is reported. The export market has also quieted down. Elec-

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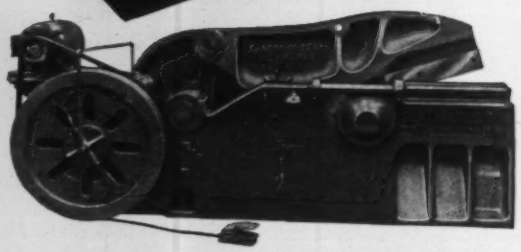

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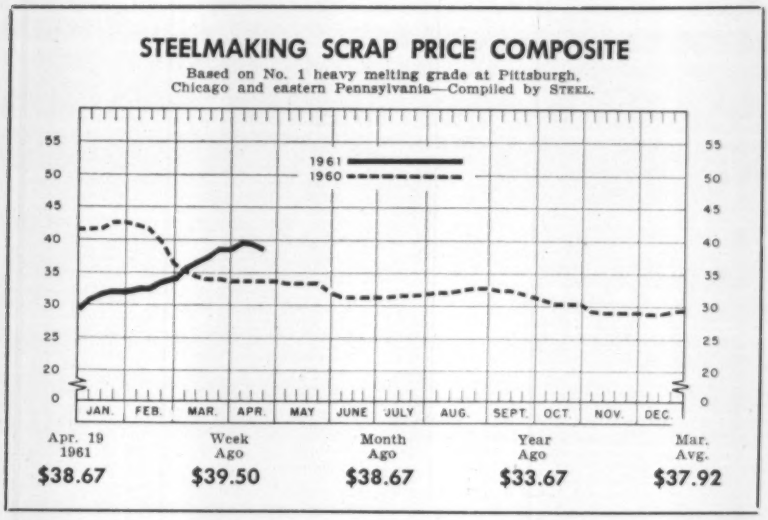


tric furnace bundles are off 50 cents a ton to $37-$38. However, random length rails are up $3 a ton to $41-$42.

• **Houston**—Export prices on iron and steel scrap have fallen as much as $2.50 a ton in the Gulf Coast market. With domestic mills doing little buying, there's a general feeling that prices are due to decline. However, cupola cast iron went up $1 last week to $37-$38. Because of the decline in export interest, No. 2 bundles are off $1 to $25-$26.

• **San Francisco** — Domestic mills have been out of the market for any worthwhile tonnages for so long that most dealers continue to concentrate on filling foreign shipments.

• **Seattle**—The market is firm, and increased tonnage is available as shipments into dealers' yards increase. The volume of turnover is being maintained, as are prices. While it's reported that $45 has been paid for special lots of No. 1 heavy melting, the published level of $44 is generally observed.

A 9000 ton cargo left this area for Japan a week ago, and another cargo is scheduled for shipment in May. District exporters are also shipping smaller lots.

• **Los Angeles**—Both export and domestic requirements have slowed down. Result: Prices have dropped noticeably on the leading steelmaking grades.

FTC Examiner Recommends Action in Luria Case

A Federal Trade Commission examiner, John Lewis, recently held that Luria Bros. & Co. Inc., Philadelphia, and 17 steel companies have maintained illegal agreements that hampered competition in the ferrous scrap industry.

He recommended the FTC issue an order that would affect the scrap purchasing practices of the 17 steelmakers. In addition, he urged that Luria be required to sell two firms it had acquired several years ago, Pueblo Compressed Steel Corp., Pueblo, Colo., and Southwest Steel Corp., Pittsburgh.

The commission examiner's findings would require the 17 steel producers during the next five years to buy at least 50 per cent of their scrap from other suppliers that submitted offers comparable to those quoted by Luria. He dismissed for lack of proof charges that Luria violated the antitrust law by acquiring A. M. Wood & Co. Inc., Philadelphia, Lipsett Inc., New York, Lipsett Steel Products Inc., Brooklyn, N. Y., Apex Steel & Supply Co., Chicago, and an affiliate, Cermack-Laflin Corp.

He also recommended dismissal of a complaint that the Hugo New Corp., New York, export-import company, joined with Luria in unlawfully restraining trade by forming a combination to act as the exclusive supplier for five Japanese steel producers.

The examiner's recommendations in the case, under study since 1954, now go to the full commission for acceptance, modification, or rejection.

Companies listed in the action, in addition to Luria, are: Bethlehem Steel Corp., New York, and two subsidiaries, Bethlehem Steel Co., Bethlehem, Pa., and Bethlehem Pacific Coast Steel Corp., San Francisco; U. S. Steel Corp., New York; National Steel Corp., Pittsburgh, and a subsidiary, Weirton Steel Co., Weirton, W. Va.; Colorado Fuel & Iron Corp., Denver, and a subsidiary, John A. Roebling's Sons Corp., Trenton, N. J.; Phoenix Iron & Steel Co., Phoenixville, Pa.; Granite City Steel Co., Granite City, Ill.; Lukens Steel Co., Coatesville, Pa.; Detroit Steel Corp., Detroit; McLouth Steel Corp., Detroit; Baldwin-Lima-Hamilton Corp., Eddystone, Pa.; Edgewater Steel Co., Oakmont, Pa.; Bucyrus-Erie Co., South Milwaukee, Wis.; Grinnell Corp., Providence, R. I.

Pig Iron . . .

Pig Iron Prices, Page 189

Merchant pig iron demand is improving, but with foundry needs lagging expectations, furnace bookings continue disappointing. One Birmingham District iron producer is shipping more tonnage than he is producing and expects to blow in another blast furnace if the improvement in demand continues. Demand from the missile industry is boosting output of castings on the West Coast.

Tubular Goods . . .

Tubular Goods Prices, Page 188

Orders for line pipe show little improvement. Producers are hoping the administration's proposals for expediting Federal Power Commission clearance of gas transmission projects will be adopted soon enough to give 1961 pipe shipments a boost. The 7000 miles of pipeline awaiting FPC approval will require up to 1.4 million tons of large diameter pipe.

West Shore Pipe Line Co., Chicago, formed by ten major oil companies, plans a $22 million common carrier pipeline linking Chicago area refineries with points in Milwaukee and Green Bay, Wis. Construction of the 285 mile system

(*Please turn to Page* 199)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Apr. 19, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Apr. 19	$38.67
Apr. 12	39.50
Mar. Avg.	37.92
Apr. 1960	33.67
Apr. 1956	54.90

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	31.00-32.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	27.00-28.00
No. 1 busheling	36.00-37.00
No. 1 factory bundles	45.00-46.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Short turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	40.00-41.00
3 ft and under	39.00-40.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	42.00-43.00
Electric furnace bundles	43.00-44.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	37.00-38.00
Stove plate	37.00-38.00
Unstripped motor blocks	27.00-28.00
Clean auto cast	33.00-34.00
Drop broken machinery	45.00-46.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
Rails, 2 ft and under	*51.00-52.00*
Rails, 18 in. and under	*51.00-52.00*
Random rails	46.00-47.00
Angles, splice bars	*45.00-46.00*
Railroad specialties	*45.00-46.00*
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*39.00-40.00*
No. 1 hvy melt., dealer	37.00-38.00
No. 2 hvy melting	30.00-31.00
No. 1 factory bundles	42.00-43.00
No. 1 dealer bundles	37.00-38.00
No. 2 bundles	*22.00-23.00*
No. 1 busheling, indus.	*39.00-40.00*
No. 1 busheling, dealer	37.00-38.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	41.00-42.00
Punchings & plate scrap	43.00-44.00

Cast Iron Grades

No. 1 cupola	43.00-44.00
Stove plate	38.00-39.00
Unstripped motor blocks	35.00-36.00
Clean auto cast	48.00-49.00
Drop broken machinery	48.00-49.00

Railroad Scrap

No. 1 R.R. heavy melt.	*40.00-41.00*
R.R. malleable	47.00-48.00
Rails, 2 ft and under	51.00-52.00
Rails, 18 in. and under	52.00-53.00
Angles, splice bars	44.00-45.00
Axles	59.00-60.00
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles, solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	95.00-100.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	33.00-34.00
No. 2 bundles	21.00-22.00
No. 1 busheling	30.00-31.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Stove plate	26.00-27.00
Heavy breakable	25.00-26.00
Unstripped motor blocks	23.00-24.00
Charging box cast	27.00-28.00
Clean auto cast	38.00-39.00

CLEVELAND

No. 1 heavy melting	*33.00-34.00*
No. 1 heavy melting	24.00-25.00†
No. 1 factory bundles	40.00-41.00†
No. 1 bundles	*33.00-34.00*
No. 2 bundles	23.00-24.00†
No. 1 busheling	*33.00-34.00*
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	33.00-34.00
Cut structurals, plate, 2 ft and under	*38.00-39.00*
Low phos. punchings & plate	*34.00-35.00*
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	*35.00-36.00*

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	45.00-46.00
Burnt cast	32.00-33.00
Drop broken machinery	46.00-47.00

Railroad Scrap

R.R. malleable	*47.00-48.00*
Rails, 2 ft and under	*47.00-48.00*
Rails, random lengths	44.00-45.00
Rails, 18 in. and under	*48.00-49.00*
Cast steel	*39.00-40.00*
No. 1 railroad cast	*48.00-49.00*
Railroad specialties	*44.00-45.00*
Angles, splice bars	*43.50-44.50*
Rails, rerolling	*53.00-54.00*

Stainless Steel Scrap
(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	70.00-75.00
430 clips, bundles, solids	70.00-75.00
430 turnings	15.00-25.00

YOUNGSTOWN

No. 1 heavy melting	*36.00-37.00*
No. 2 heavy melting	*25.00-26.00†*
No. 1 busheling	*36.00-37.00*
No. 1 bundles	*36.00-37.00*
No. 2 bundles	*25.00-26.00†*
Machine shop turnings	14.00-15.00†
Shovel turnings	19.00-20.00†
Cast iron borings	19.00-20.00†
Low phos.	*37.00-38.00*
Electric furnace bundles	*38.00-39.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*37.00-38.00*

BUFFALO

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	*26.00-27.00*
No. 1 bundles	31.00-32.00
No. 2 bundles	*24.00-25.00*
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-46.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Rails, rerolling	*61.00-62.00*
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	28.50-29.50
No. 1 bundles	33.00-34.00
No. 2 bundles	21.00-22.00
No. 1 busheling	32.00-33.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	12.00-13.00
Shovel turnings	13.00-14.00
Cast iron borings	12.00-13.00
Low phos. 18 in.	39.00-40.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Heavy breakable cast	29.00-30.00
Charging box cast	35.00-36.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
Rails, 18 in. and under	46.00-47.00
Rails, random lengths	40.00-41.00

PHILADELPHIA

No. 1 heavy melting	*41.00*
No. 2 heavy melting	*36.00*
No. 1 bundles	*42.00*
No. 2 bundles	*26.00*
No. 1 busheling	*42.00*
Electric furnace bundles	*44.00*
Mixed borings, turnings	17.00†
Shovel turnings	21.00†
Machine shop turnings	16.00†
Heavy turnings	27.00†
Structurals & plates	*45.00-47.00*
Couplers, springs, wheels	46.00
Rail crops, 2 ft & under	52.00-54.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	41.00
Drop broken machinery	50.00-51.00
Malleable	51.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	5.50-6.00†
Mixed borings, turnings	6.00-6.50†
Shovel turnings	7.00-8.00†
Low phos. structural & plates	32.00-33.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	29.00-30.00
No. 1 bundles	32.00-33.00
No. 2 bundles	23.00-24.00
No. 1 busheling	32.00-33.00
Cast iron borings	10.00-11.00
Machine shop turnings	19.00-20.00
Shovel turnings	21.00-22.00
Bar crops and plates	43.00-44.00
Structurals & plate	42.00-43.00
Electric furnace bundles	*37.00-38.00*
Electric furnace:	
3 ft and under	36.00-37.00
2 ft and under	37.00-38.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	44.00-45.00
Unstripped motor block	32.00-33.00
No. 1 wheels	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt	33.00-34.00
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	*41.00-42.00*
Angles, splice bars	43.00-44.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	35.00
No. 2 heavy melting	29.00
No. 1 bundles	35.00
No. 2 bundles	25.00
No. 1 busheling	34.00
Machine shop turnings	13.00
Shovel turnings	16.00

Cast Iron Grades

No. 1 cupola	41.00
Charging box cast	35.00
Heavy breakable cast	33.00
Unstripped motor blocks	35.00
Clean auto cast	41.00
Stove plate	34.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00
Rails, random length	39.00†
Rails, rerolling	52.00-53.00
Rails, 18 in. and under	41.00-42.00
Angles, splice bars	40.00†

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	36.00
No. 1 bundles	37.00-38.00
No. 2 bundles	*25.00-26.00*
Machine shop turnings	12.00-13.00
Low phos. plate & structurals:	
3 ft	43.00
2 ft and under	45.00-46.00

Cast Iron Grades

No. 1 cupola	*37.00-38.00*
Heavy breakable	26.00-27.00
Foundry malleable	30.00-31.00
Unstripped motor blocks	31.00-32.00

Railroad Scrap

R.R. heavy melt (3 ft)	43.00

LOS ANGELES

No. 1 heavy melting	*35.00-37.00*
No. 1 hvy melt (export)	*39.00-42.00*
No. 2 heavy melting	*33.00-37.00*
No. 2 hvy melt (export)	*38.00-39.00*
No. 1 bundles	*29.00-31.00*
No. 2 bundles	*19.00-24.00*
No. 2 bundles (export)	*26.00-27.00*
Machine shop turnings	*15.00-17.00*
Shovel turnings	*15.00-17.00*
Cast iron borings	*16.00-17.00*
Cut structurals and plate 1 ft and under	52.00

Cast Iron Grades

No. 1 cupola	*50.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00-41.00*

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	41.00
No. 2 bundles	34.00
Shovel turnings	16.00-18.00
Electric furnace bundles	52.00

Cast Iron Grades

No. 1 cupola	40.00-42.00
Heavy breakable	36.00-37.00
Unstripped motor blocks	37.00
Stove plate (f.o.b. plant)	37.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	44.00
No. 1 hvy (unprepared)	41.00
No. 2 heavy melting	41.00
No. 2 hvy (unprepared)	38.00
No. 2 bundles	34.00
Shovel turnings	16.00
Electric furnace bundles	50.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Unstripped motor blocks	37.00
Stove plate (f.o.b. plant)	37.00

SAN FRANCISCO

No. 1 heavy melting	42.00**
No. 2 heavy melting	39.00**
No. 1 bundles	34.00**
No. 2 bundles	27.00**
Machine shop turnings	20.00**
Mixed borings, turnings	20.00**
Cast iron borings	20.00**
Heavy turnings	20.00**
Shovel turnings	20.00**
Cut structurals, 3 ft	44.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Charging box cast	34.00
Stove plates	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

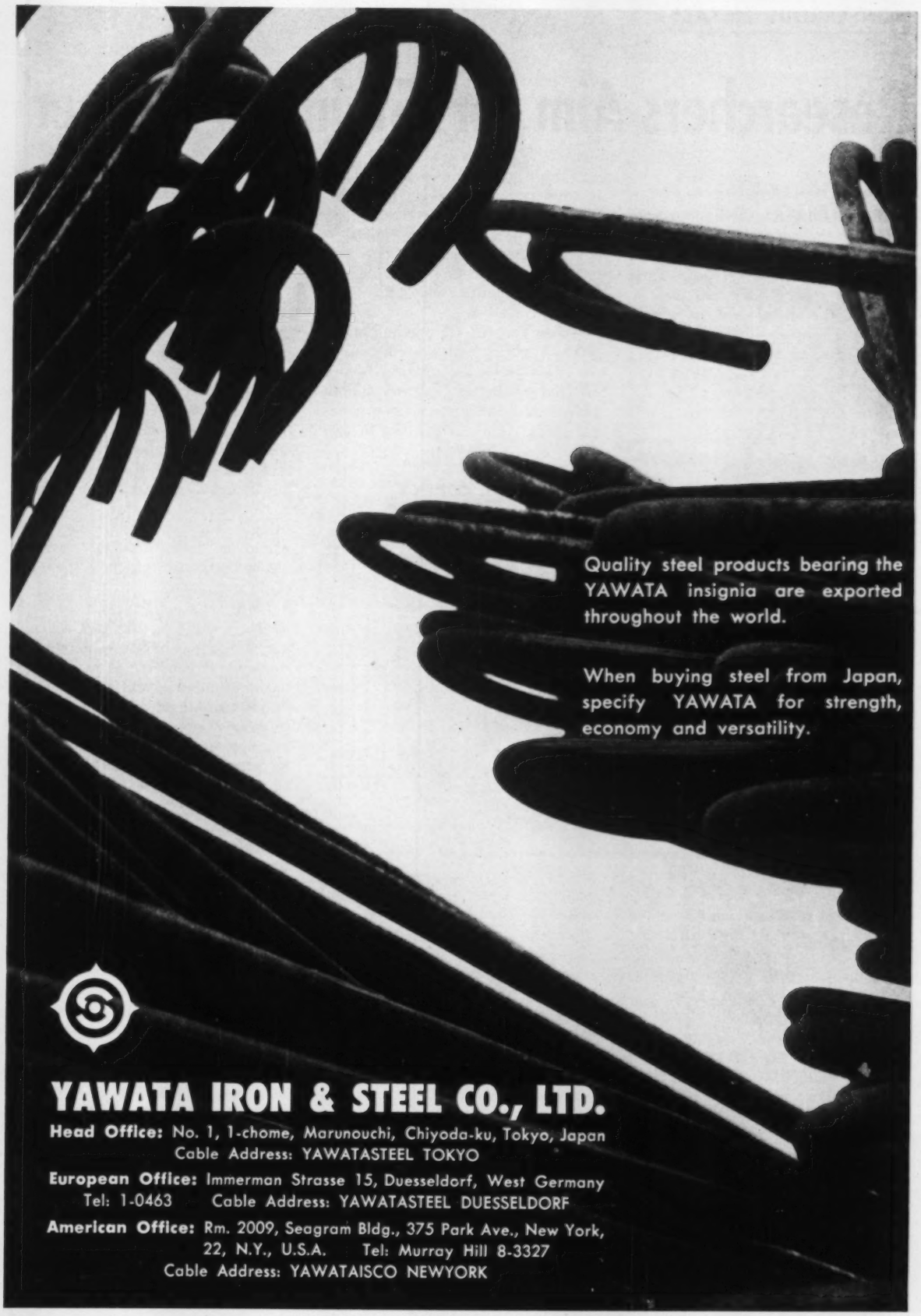
(Brokers' buying prices; net tons)

No. 1 heavy melting	31.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	31.00
Unprepared	25.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

*For export add $4 dock charge.
**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.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Researchers Aim for 'Stainless Copper'

Nonferrous Metal Prices, Pages 198 & 199

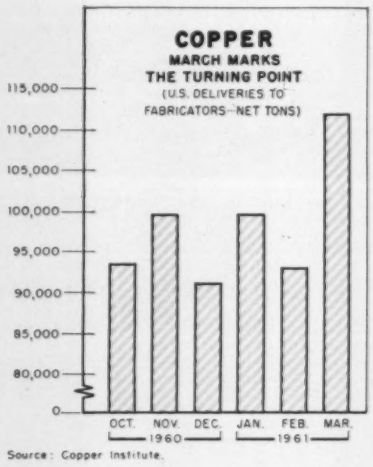
THE NUMBER ONE research target of the copper industry is to come up with a "stainless copper." Researchers and market people are convinced that if they can offer a form of the metal and its alloys that will withstand ordinary atmospheric exposure and handling without tarnishing, corroding, or changing color, they will reap big dividends.

Oxidation has been the big problem in scores of copper applications. One approach that seems feasible: The formation of a thin, transparent film of oxide of another metal on the surface of the copper, explains Dr. Charles H. Moore, technical director of the Copper Products Development Association. An alternate approach, and one on which research is also underway, involves transparent plastic coatings and other organic and inorganic finishes. Evaluates Dr. Moore: "The evidence to date indicates that we shall at least be able to produce coatings more wear resistant and enduring than the present lacquers used to coat copper and brass products."

• **Aggressive Research**—The type of co-operative research Dr. Moore's organization is doing (33 companies which account for over 90 per cent of the Free World's copper production are members) marks a radical departure for the industry. Traditionally, research efforts of producers have been as tightly guarded as the location of King Solomon's mines. The practice led to a form of inbreeding and made the industry easy prey to the high powered promotional campaigns of aluminum when producers of that metal began their big push in the early 1950s.

A change in attitude is pointed up by the one year old association's stated philosophy that it will be aggressive rather than defensive in its research. States Dr. Moore: "We do not claim that our intent is to win back markets that aluminum, plastics, and stainless steel have taken. Instead, we plan to develop copper as the one best material for specific uses, regardless of price or competitive material."

• **Other Targets**—The second major product development objective: Copper to improve the performance of internal combustion engines and to prevent the discharge of smog forming gases. Those aims take in two possible applications. First: Use of copper additives to fuels as combustion catalysts. (Market estimates based on the 1959 consumption of other metal-based fuel additives place the potential consumption of copper in this application at about 50,000 tons a year in the U. S. alone, with a possible increase to 75,000 tons by 1970, says Dr. Moore.) Second: Use of copper in combination with other metals as a construction material for engine heads or other engine parts that are in contact with the combustion chamber (to obtain a beneficial catalytic effect).



Source: Copper Institute.

Copper researchers are also viewing such everyday products as gutters and downspouts. It's conceivable, believes the association, that a high strength alloy, no thicker than twenty-thousandths of an inch, might reduce the cost differential between copper and competing materials, simplify installation, and make the system more rigid.

Copper roofs, more competitive in price and easy to install, are being investigated. Most of the ideas in this area involve a relatively thin copper sheet bonded to other materials such as plywood, asbestos, or felt, to provide the needed thickness, resistance to mechanical damage, and insulation value. Examples of projected uses: Copper roofing panels installed in a rubber matrix; a copper-clad asbestos or asphalt shingle; a copper foil roofing that would be rolled in place over a sprayed adhesive base.

• **More Uses for Foil**—Dr. Moore's group is studying the idea of copper foil as a moisture barrier in contact with concrete, as an economy flashing material, and as a moisture "stop" in bathrooms. Another possibility: Copper foil in plastic laminations for sink and table tops to prevent damage by hot pans, cigarets, and other localized heating.

• **Brainstorming** — Several other products are already being researched. In addition, here are some programs under consideration for research and development:

- Die formed, copper-base metal brake drums, for quick heat dissipation and prevention of brake fading.
- Improved copper-bearing, cast irons and cast steels for a variety of structural and product design purposes (some work is already underway here).
- Combinations of copper and aluminum in electrical applications.
- Thin section, high strength, copper-base, heat transfer units, possibly formed by novel techniques.
- Copper liners for swimming pools.
- Rigidized, plastic-foam-backed, copper curtain wall materials, protected from tarnish by inorganic coatings.

ANOTHER NORTON PRODUCT

Push up the output

with RESINALL belts

DOWN goes production time and up go profits. That's the story time and time again with Behr-Manning *resin*-bonded* belts and discs. There's less breakdown from heat and loading; more and better cutting per belt dollar.

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BEAR BRAND Abrasives

(Guard has been removed from machine for photo.)

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 29.00; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 29.00 deld.; custom smelters, 29.00; lake, 29.00 deld.; fire refined, 28.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $206-208 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz, nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 107.875.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 11.50; brass special 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.25-26.00; No. 12 foundry alloy (No. 2 grade), 21.75-22.25; 5% silicon alloy, 0.60 Cu max, 23.50-24.00; 13 alloy, 0.60 Cu max., 23.50-24.00; 195 alloy, 24.75-25.75; 108 alloy, 22.25-22.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.25; grade 2, 22.00; grade 3, 21.00; grade 4, 20.00.

Brass Ingot: Red brass, No. 115, 29.75; tin bronze, No. 225, 39.25; No. 245, 33.75; high leaded tin bronze, No. 305, 34.00; No. 1 yellow, No. 405, 29.25; manganese bronze, No. 421, 28.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.935, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.935, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 34.355; l.c.l., 34.98. Weatherproof, 20,000-lb lots, 35.55; l.c.l., 36.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-114	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 22.00-22.50; No. 2 heavy copper and wire, 20.75-21.25; light copper, 18.25-18.75; No. 1 composition red brass, 19.25-19.75; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	54.13b	51.36c	....	55.32
Yellow Brass	48.10	33.71d	48.39	52.26
Low Brass, 80%	50.65	50.39	50.94	54.71
Red Brass, 85%	51.54	51.48	51.83	55.60
Com. Bronze, 90%	52.98	52.92	53.27	56.79
Manganese Bronze	56.56-56.59	50.22-50.24	60.47	....
Muntz Metal	50.94	46.25	....	....
Naval Brass	52.86	46.67	59.17	57.02
Silicon Bronze	59.49	58.68	58.78	77.90
Nickel Silver, 10%	63.66	65.99	65.74	....
Phos. Bronze, A-5%	74.59	75.09	74.34	76.52

SCRAP ALLOWANCES e

(Based on copper at 29.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	25.000	25.000	24.250
Yellow Brass	19.250	18.375	17.375
Low Brass, 80%	21.375	21.125	20.625
Red Brass, 85%	22.250	22.000	21.500
Com. Bronze, 90%	23.000	22.750	22.250
Manganese Bronze	18.000	17.750	17.250
Muntz Metal	18.125	17.875	17.375
Naval Brass	18.000	17.750	17.250
Silicon Bronze	24.500	24.250	23.500
Nickel Silver, 10%	24.125	23.875	12.062
Phos. Bronze, A-5%	26.125	25.875	24.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 18.25-18.75; new brass clippings, 16.25-16.75; light brass, 13.25-13.75; heavy yellow brass, 14.25-14.75; new brass rod ends, 15.25-15.75; auto radiators, unsweated, 14.50-15.00; cocks and faucets, 16.00-16.50; brass pipe, 16.50-17.00.

Lead: Soft scrap lead, 7.25-7.75; battery plates, 3.00-3.25; linotype and stereotype, 8.00-8.25; electrotype, 7.50-7.75; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-23.50; old sheets, 22.00-23.00; turnings, 16.50-17.00; rods, 22.00-23.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 3.50-4.00; new diecast scrap, 3.50-4.00; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 9.00-9.50; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.00-11.50; segregated high copper clips, 10.00-10.50; mixed low copper clips, 10.50-11.00; mixed high copper clips, 10.00-10.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 9.75-10.25; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00; clean borings and turnings, 9.00-9.50; segregated low copper clips, 14.00; segregated high copper clips, 13.50; mixed low copper clips, 13.50; mixed high copper clips, 13.00-13.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 55.00; light scrap, 50.00; turnings and borings, 35.00.

Copper and Brass: No. 1 heavy copper and wire, 26.25; No. 2 heavy copper and wire, 24.50; light copper, 22.25; refinery brass (60% copper) dry copper content, 23.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.25; No. 2 heavy copper and wire, 24.50; light copper, 22.25; No. 1 composition borings, 22.00; No. 1 composition solids, 22.50; heavy yellow brass solids, 17.00; yellow brass turnings, 15.00; radiators, 17.75.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.
Copper: Flat-rolled, 46.04; oval, 42.50; electrodeposited, 38.00; cast, 40.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 109.00; 500-1999 lb, 102.00; 2000-4999 lb, 98.50; 5000-29,999 lb, 97.50; 30,000 lb, 96.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 125.50; 200-499 lb, 124.00; 500-999 lb, 123.50; 1000 lb or more, 123.00.

Zinc: Balls, 18.75; flat tops, 18.75; flats 21.50; ovals, 20.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.00; 2000-5900 lb, 13.00; 6000-11,900 lb, 12.75; 12,000-22,900 lb, 12.50; 23,000 lb or more, 12.00.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 82.30; 100-600 lb, 72.70; 700-1900 lb, 70.00; 2000-9900 lb, 68.10; 10,000 lb or more, 66.80.

Stannous Chloride (Anhydrous): 25 lb, 158.10; 100 lb, 153.20; 400 lb, 150.70; 800-19,900 lb, 109.90; 20,000 lb or more, 103.80.

Stannous Sulphate: Less than 50 lb, 143.10; 50 lb, 113.10; 100-1900 lb, 111.10; 2000 lb or more, 109.10.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 193*)

starts in June. It will be a 16 in. diameter line from Chicago to Milwaukee and 10 in. from Milwaukee to Green Bay.

Cesium Metal Prices Are Cut About 50 Per Cent

Penn Rare Metals Inc., Revere, Pa., producer of rare and exotic elements in compound and metallic form, last week announced a reduction of about 50 per cent in its prices on cesium metal—it becomes liquid just above room temperature and boils at a high temperature.

It is used as a heat transfer fluid in high specific heat applications, such as compact, space powerplants. It is also employed as a working fluid in ion engine space propulsion systems and in thermionic converters or "plasma thermocouples" for the conversion of heat into electricity.

The new prices make 99.5 per cent pure cesium available at $100 a pound in quantities of 1000 lb or more. In the same quantities, 99.9 per cent pure grade will sell for $125 a pound. In lesser quantities the per pound prices are:

Quantity	99.5%	99.9%
1—9 pounds	$300.00	$375.00
10—24 pounds	250.00	315.00
25—99 pounds	200.00	250.00
100—499 pounds	175.00	220.00
500—999 pounds	150.00	190.00

The company also packages cesium in 1, 5, 10, 25, 50, and 100-gram glass samples.

Wire . . .

Wire Prices, Pages 184 & 187

Seasonal influences are boosting demand for merchant wire products—in New England, April volume is estimated to be 10 per cent over the first quarter average. Industrial demand for manufacturers' wire, however, has not kept pace, though it's slightly better than it was earlier this year. Industrial requirements are so spotty the mills are finding it difficult to maintain economical production schedules because of the wide variety of specifications in small lots.

CLASSIFIED ADVERTISING

Help Wanted

SENIOR CONTRACTS ESTIMATOR
A large steel plate fabricator in the Chicago area requires an engineer to be responsible for the development of standards and procedures which permit the company to bid as a general contractor where our products are a dominant portion of the job. He will be responsible for developing costs of foundations, earth work, painting, auxiliary electrical, etc. In addition, this position includes participation in bids prepared as joint ventures. This position will carry supervisory responsibilities by projects. A candidate should have a technical degree from a fully accredited university—preferably Civil Engineering with a major in structures, soil mechanics or concrete. He should have at least 5 years of estimating experience on general construction projects. In the absence of full academic compliance, specific experience may be substituted. This position carries a nine to twelve thousand dollar starting salary. Please reply to Box 929, STEEL, Penton Bldg., Cleveland 13, Ohio, sending complete resume.

MANUFACTURERS AGENT INDUSTRIAL LUBRICANTS
Required by established manufacturer of industrial lubricants with choice territory and active accounts—Chicago and vicinity. Reply Box 931, STEEL, Penton Bldg., Cleveland 13, Ohio.

SENIOR CONTRACTING ENGINEER CHICAGO LOCATION
Responsible for accurate and effective handling of contract documents beginning at the inquiry stage, through estimating, proposal preparation and coordination with Sales Department during final presentation. This involves direct customer contact and close liaison with all departments. Applicant must have university degree in Civil or Mechanical Engineering. Reply Box 930, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

MANAGER, active New York Steel service center, desires to relocate West Coast. 13 years with present employer. Reply Box 928, STEEL, Penton Bldg., Cleveland 13, Ohio.

WANTED
Used two-ton or three-ton electric arc melting furnace complete with transformer and controls. Contact W. T. Lindsay.
GENERAL ELECTRIC COMPANY
Schenectady, New York
Building 59, Room 105.

For Sale

FOR SALE
Automatic 14,000# capacity low lift electric platform truck, brand new, unused surplus. Factory Price — $13,000.00 — Our Price $4800.00 with new unconditional guarantee.
Mobile Industrial Equipment Corp.
9th & Tioga Streets Philadelphia 40, Pa.
BAldwin 6-1200

Help Wanted

ADMINISTRATIVE SALES POSITION STEEL TUBING MANUFACTURER
Nationally recognized Mid-West steel tubing producer has an immediate opening for a man of executive calibre. 30-45 years old (preferred), with a current and thorough sales-technical background in electric resistance welded steel tubing. Attractive compensation with unusually fine incentive features. Submit complete resume giving personal history, education, experience and salary requirements. Replies held in strict confidence. Box 925, STEEL, Penton Bldg., Cleveland 13, Ohio.

FOR CLASSIFIED RATES
And further information write
STEEL, Penton Bldg., Cleveland 13, O.

To solve your toughest stripping problem

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS

Strip any type of paint fast... even epoxies ...with modern Oakite strippers

Even your toughest paint-removal problems can be solved with Oakite strippers. A dozen alkaline and solvent-type removers and additives are available to satisfy all needs. In the fastest, most economical way, they enable you to get a clean, smooth surface for repainting.

Oakite strippers are available to fit every method of application including soak tank...brush...steam gun. Look at these typical results:

- Stripping rejected television cabinets of paint and phosphate coating took 25 minutes before the proper Oakite material eliminated three steps, slashing time to 10 minutes.
- An auto parts maker says that a continuous cycle of 1 minute and 50 seconds "works like a charm stripping paint and incidental rust from rejects and hooks."
- Brass plated steel parts were stripped of their epoxy finish in a matter of minutes.

For stripper recommendation, just tell us your paint removal problem—the base metal, the paint type, number of paint layers, size of items to be stripped. Or ask your local Oakite man. Send for bulletin. Oakite Products, Inc., 26 Rector Street, New York 6, N. Y.

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PERFORATED METAL MEANS PERFECT SCREENS

Specially Fabricated for ALL INDUSTRIES BY

CHARLES MUNDT & SONS

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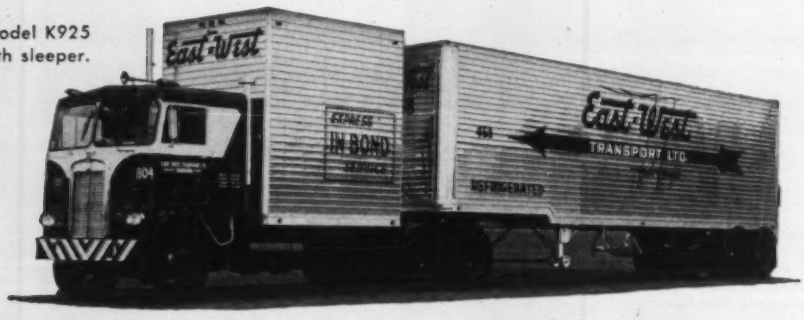
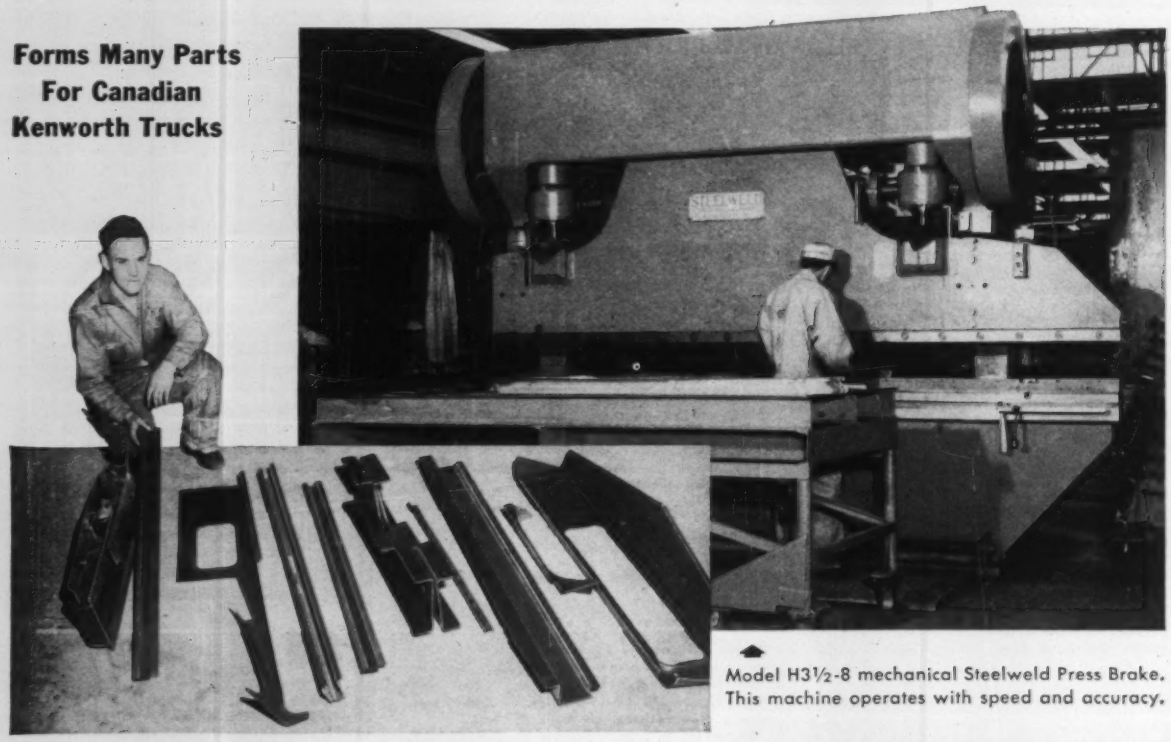


Canadian Kenworth model K925 C.O.E. tilt cab with sleeper.

TRUCK PRODUCTION KEEPS STEELWELD PRESS BRAKE BUSY

Forms Many Parts For Canadian Kenworth Trucks



Model H3½-8 mechanical Steelweld Press Brake. This machine operates with speed and accuracy.

A great amount of steel is formed into a variety of shapes on a mechanically-operated Steelweld Press Brake in the modern truck plant of Canadian Kenworth, Ltd., Vancouver, B. C.

Kenworth trucks are custom built to each customer's requirements and are widely used in Canada, the United States, and in many parts of the world where an extra rugged vehicle is required to give satisfactory service.

Since the trucks are made individually, or in small lots, it follows that parts for them are made up in correspondingly small numbers. The Steelweld brake has been found outstanding for this work because of the ease and convenience of the control and gauging devices which permit quick die changes. The bed and ram extension adds to its flexibility of use.

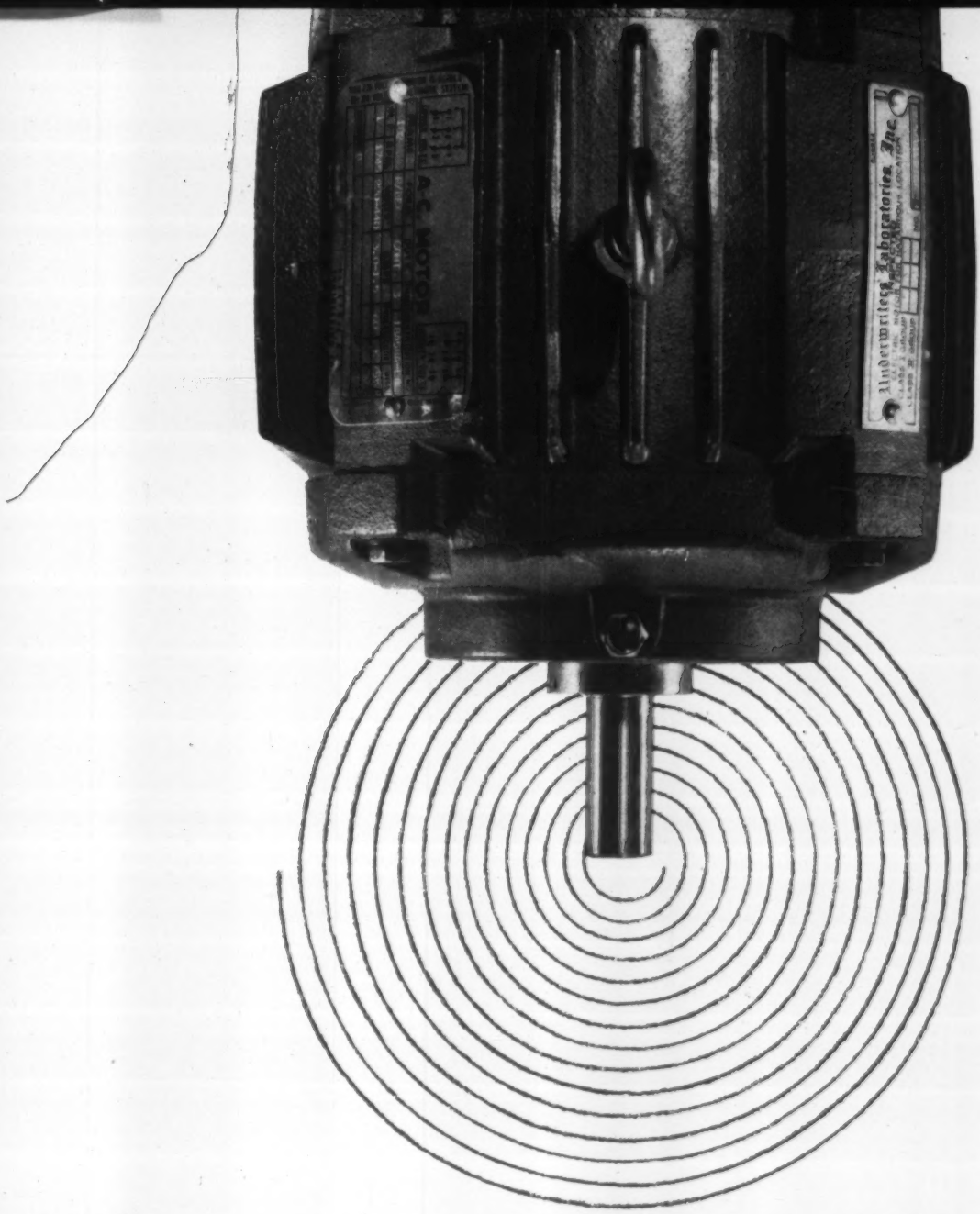
The Steelweld brake, and also a Steelweld shear, have been in continuous satisfactory service since 1955 when the Vancouver plant was put into operation.

Write for free booklet No. 2023

STEELWELD
Mechanical and Hydraulic
PRESS BRAKES

Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. 7881 E. 281st ST. • WICKLIFFE, OHIO



OPEN UP: for better electrical steels

The Open Coil Process of Gas Alloying permits the control of carbon after the steel has been rolled. Carbon can be removed during the annealing operation. This means that silicon steels of better magnetic properties can be easily and economically produced. By removing carbon from plain carbon steel it becomes an excellent replacement for low silicon grades in many applications. To get all the details on this revolutionary new Open Coil Process of Gas Alloying write for Bulletin OC-960 to *Lee Wilson Engineering Co., Inc., 20005 Lake Rd., Cleveland 16, Ohio.*

Lee Wilson

Originators and Leading Producers of Open Coil and Single Stack Furnaces

PORTRAIT OF PROGRESS: *Wean No. 2 Alkaline Tinning Line at Granite City Steel Company's Granite City Works*

Granite City Increases its Range of Tin Plate Widths with New Wean Alkaline Line

To supply the full range of coil widths required by the can manufacturing companies it serves, Granite City Steel Company recently installed this Wean alkaline-type tinning line.

Capable of handling coils up to 40,000 lbs. with an outside diameter of 72", this line is designed to process tin plate at speeds up to 1200 fpm. The line can accommodate strip from 18" to 38" in width and from .003" to .015" in thickness.

The new Wean line has been designed to economically produce differential plating, providing more versatility in meeting customer requirements. Strip storage is provided in looping towers at both the entry and exit sections of the line in order to maintain constant flow of material through the processing section.

During its three-decade partnership with the steel industry, Wean Engineering Company has designed more than 80% of all electrolytic tinning facilities in operation today. We invite you to put this experience to work on your next tinning line project.

THE WEAN ENGINEERING COMPANY, INC. · WARREN, OHIO